Published May 11, 1943

Serial No. 347,311

450,937

ALIEN PROPERTY CUSTODIAN

INSECTICIDES

Hans von Philipp, Leipzig, Germany; vested in the Alien Property Custodian

No Drawing. Application filed July 24, 1940

This invention relates to insecticides and is directed more particularly to insecticides of the character disclosed in my co-pending application Serial No. 157,063, filed August 2, 1937, of which this application is a division.

In the course of the exploration and examination of new insecticides, there was made the surprising discovery, that in general the insecticiding effect is very considerably increased, by adding to one or more insecticiding substances small quantities of one or more other insecticiding substances. As a remarkable matter of fact it has been found, that generally additions of a few per cent of an insecticiding substance—often only 0.5%—are sufficient to increase the efficacy of another insecticiding substance very considerably. In many cases the efficacy has even been multiplied.

Examples

1. A composition of 95% of Paradichlorbenzene and 5% of Hexachlorethane will kill moth-worms within 6 hours, whereas pure Paradichlorbenzene, employed under quite the same conditions, will kill them only after 72–92 hours. By the addition of only 5% of Hexachlorethane, the efficacy of which on moth-worms is far inferior to that of Paradichlorbenzene, the insecticiding efficacy of the latter has been multiplied.

2. One part of an insecticide of a specially great efficacy product "P" is mixed up with 99 parts of Paradichlorbenzene. This composition will kill the moth-worms after 4–5 hours, whereas pure Paradichlorbenzene, under just the same conditions, will kill them only after 72–92 hours, and the product "P" after 9 hours. By the addition of 1% of the insecticide "P" the efficacy of Paradichlorbenzene has become almost 20 times stronger. (Product "P" is Parachlorobromobenzene.)

3. On examining the efficacy of a composition of 98% of Hexachlorethane and 2% of an insecticide "M" on moths (butterflies), it was found that these butterflies were killed after 1½–2 hours. Hexachlorethane itself will kill the moths (butterflies) under the same conditions only after 24 hours, whereas the product "M" kills them after 1¼ hour. Thus, the effect obtained by the addition of 2% of the insecticide "M" means in this case a reduction of the necessary time to kill the moths to about one tenth of the time, which is necessary when using Hexachlorethane only. (Product "M" is Acetonechloroform.)

4. It is surprising that a composition of 10% of the product "M" and 90% of Paradichlorbenzene killed moth-worms after 6 hours, whereas Paradichlorbenzene usually kills them only after 72–92 hours. In this case, by the addition of 10% of the product "M", the insecticiding efficacy of the Paradichlorbenzene has been more than decupled.

5. On examining the efficacy of a composition of 1.5% of the product "M" and 98.5% of Paradichlorbenzene on moths (butterflies), it was found, that the moths were killed after 30 minutes instead of 4 hours, which means that the efficacy of Paradichlorbenzene has been more than octupled.

6. By the addition of 5% of the product "M" to 95% of Hexachlorethane the insecticiding efficacy of the latter on moth-worms has been multiplied. The results of three experiments made in a correct manner and under quite the same conditions with four moth-worms each, have in all these cases shown, that this composition requires only 20 hours to kill the moth-worms, whereas Hexachlorethane itself kills them only in the course of a fortnight.

7. Three experiments made with a composition of 2% of Thymol and 98% Paradichlorbenzene have in all cases given the result, that the moth-worms were killed after 16–20 hours instead of 72–92 hours, which is the case when using Paradichlorbenzene only. This means a triplication and more of the original efficacy of Paradichlorbenzene.

8. A composition of 0.75% of Thymol, 0.75% of the product "M" and 98.5% of Paradichlorbenzene killed moths (butterflies) after 1.5 hour only, whereas Paradichlorbenzene kills them after 4 hours. This fact has been proved by three experiments.

9. Six experiments with 4 moths (butterflies) each and a composition of 1% of the product "P," 1% of the product "M" and 98% of Paradichlorbenezne gave the following result: the moths were killed after one hour instead of 4 hours, which is the case when using pure Paradichlorbenzene.

10. Experiments with a composition of 1% of the product "P," 1% of the product "M" and 98% of Paradichlorbenzene required a time of three hours only to kill the moth-worms instead of 72–92 hours, which means, that the insecticiding efficacy of the Paradichlorbenzene has been increased by more than 20 times its original value.

My invention can be proved by a number of reports of the "Institut für landwirtschaftliche

Zoologie" (Institution for Agricultural Zoology) of the University of Berlin.

The very important technical effect of my invention is due partly to the fact, that by the above described combination, which is characterised by an insignificant addition of one or more insecticidal substances to one or more other insecticidal substances, the efficacy is increased in such a degree, that it surpasses the efficacy of the single insecticidal substances used in this combination and partly to the fact, that by the addition of only insignificant quantities of a perhaps expensive insecticide of great efficacy—whereupon this invention is based—there will be given the possibility to produce insecticides of specially great efficacy on an economically favorable base (see for instance Examples 2, 3, 5 and 10).

As illustrated by the use of acetone chloroform in Examples 3, 4, 5, 6, 8, 9 and 10 given above, I find that small quantities of compounds of the group consisting of triple or higher chlorinated aliphatic alcohols, their esters and ethers, and analogous fatty aromatic alcohols, and their esters and ethers accomplish the desired result of increasing the efficacy of the resulting insecticide over the ordinary insecticide to which such compounds have been added. Also, as shown by Examples 2, 9 and 10 above, I find that small quantities of halogenated benzenes and their derivatives, as for example, paradichlorbenzene and parachlorbromobenzene may be used to greatly increase the efficacy of the selected base insecticide; or small quantities of one or more phenol substances and their derivatives, for example, thymol to paradichlorbenzene, and isothymol to monochlorbenzene and to orthodichlorbenzene; or small quantities of halogenated aliphatic compounds such as carbon tetrachloride and chloral hydrate; or small quantities of the group consisting of halogenated aromatic compounds such as naphthaline chloride, may be used.

HANS VON PHILIPP.

Published May 11, 1943 Serial No. 347,414

ALIEN PROPERTY CUSTODIAN

APPARATUS FOR THE ARTIFICIAL RESPIRATION

Elettra Diena, nee Bruno, Turin, Italy; vested in the Alien Property Custodian

Application filed July 25, 1940

My invention relates to a new type of apparatus for mechanically performing the artificial respiration either on sick persons or persons who have met with accidents.

The importance of applying such a treatment in a great number of cases is well known, and particularly in cases of asphyxy, paresis of respiratory centres, poisoning through toxic gases, etc.

The apparatus of my invention allows of performing the artificial respiration in an entirely automatic manner, avoiding any effort by the operators, whereby the said apparatus promotes, in a similar manner to what happens in the manual practice, rhythmical movements of compression and decompression of patient's chest.

The apparatus makes use of a band to be applied to the chest of the patient, which band incorporates an elastic bag: the band is hereinafter called the "chest's band." The apparatus comprises a source of gas under pressure and a mechanically actuated distributor which controls at suitable intervals the supply of gas under pressure to the chest's band and its discharge therefrom, in such a manner that the periodical compressions and decompressions of the band give rise to corresponding movements of the patient's chest.

The invention will now be described more in detail with reference to a practical embodiment thereof, which is illustrated on the accompanying drawings.

Fig. 1 is a general view of the several parts constituting the apparatus or related thereto, all connected together; and

Figs. 2 and 3 show in perspective views, to a greater scale, the distributor casing and the rotary member mounted therein.

A source of gas under pressure, which in the case illustrated is a bottle A of compressed air, communicates, through a pressure reducer E and a pipe L, with an intermediate chamber B having a capacity of for instance 30 litres, wherein the gas is kept under a pressure less than that of the source A although superior to the atmospheric pressure, such as a pressure of about half an atmosphere. This chamber communicates through another pipe M with one of the connections, *p*, of the distributor D, which latter is actuated by a motor C. The distributor D is formed with three ports communicating with the exterior, each fitted with a suitable connection for inlet and exhaust of the gas, that is, besides the already cited connection *p*, a connection *q* for the pipe leading to the chest's band, and a connection *r* for the discharge in the atmosphere.

The chest's band consists of a band of inextendible fabric fitted with straps H and buckles I, to which is applied an elastic bag G, made of rubber, extending substantially over the whole breadth of the band but having a somewhat less length. The pipe N communicates with the said bag through a three ways cock O.

Figs. 2 and 3 illustrate the construction of the distributor D. The distributor comprises a revolving shaft U driven through a suitable reducing gear by the motor C (Fig. 1), the said shaft being fitted, in front of the connections *p* and *r* respectively, with two cylindrical sectors, or portions of drums, S and T, which fit with their peripheric surfaces air tight against the inner cylindrical surface of the casing of the distributor D, so that upon rotation of the shaft they close and open alternatively the ports in the casing corresponding to the connections *p* and *r*. The cylindrical sectors T and S are so dimensioned and arranged as to avoid any possibility of the ports of the connections *p* and *r* being simultaneously open. To this end, to the failing portion of each of the sectors there corresponds the complete portion of the other, plus a sufficient lap to avoid even a partial simultaneous opening of the said ports. In fact, the angle α corresponding to the failing portion in the sector S is less than the angle β, corresponding to the amplitude of the sector T. It is understood that the bisecting planes of angles α and β are coincident. The relative dimensions of the sectors S and T are so chosen that the port of the connection *p* remains open during about one third of each revolution of the shaft U and the port of the connection *r* during about the remaining two thirds. The rotary speed of the shaft U is invariable and is normally of 18 to 20 revolutions per minute.

For the use, the chest's band F is applied around the patient's chest by means of the straps H and buckles I in such a manner that the inextendible fabric is on the outer side. Upon the motor C being set rotating, the compressed gas in the chamber B flows during a first phase, which lasts during about one third of a complete cycle, through the connection *p* into the distributor casing and hence through the connection *q* into the elastic bag G of the chest's band, thus inflating the bag and effecting the compression of the patient's chest. During the subsequent phase, which lasts during about two thirds of a complete cycle, the sector S has closed the port of the connection *p*, thus interrupting every communi-

cation between the reservoir chamber B and the elastic bag G, whilst the sector T has opened the passage to the connection *r*. The gas in the elastic bag then flows back to the distributor D, through the pipe N and the connection *q*, and escapes in the atmosphere through the connection *r*. The phase of dilatation of the patient's chest takes thus place.

Since the distributor makes from 18 to 20 revolutions per minute, the chest is with the same rhythm compressed and permitted to dilate, which corresponds to the most convenient rhythm for the performance of the artificial respiration. Compression and decompression take place gradually, inasmuch as the sectors S and T close and open slowly the ports of the connections *p* and *r*.

In cases where the artificial respiration must be performed during long periods of time, the source of compressed gas may be, instead of a bottle, a suitable compressor driven by a motor and fitted with a reservoir.

When on the contrary the artificial respiration must be performed during relatively short periods of time, as in cases of accidents from electrical discharges, the use of a compressed air bottle will prove more convenient.

The motor for the drive of the distributor has been described, in this particular case, as an electric motor; it is evident however that it may be of any other type and may also be substituted by a clockwork actuated by a spring or a weight.

In cases of accidents of collective character, such as in case of poisoning from toxic gases, the apparatus may be foreseen for multiple use, inasmuch as by increasing the size of the distributor D and the capacity of the reservoir chamber B, a plurality of patients, each fitted with a chest's band communicating with the distributor, may be treated simultaneously, with the same rhythm.

ELETTRA DIENA NEE BRUNO.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. DIENA, NEE BRUNO

APPARATUS FOR THE ARTIFICIAL RESPIRATION

Filed July 25, 1940

Serial No. 347,414

Fig. 1

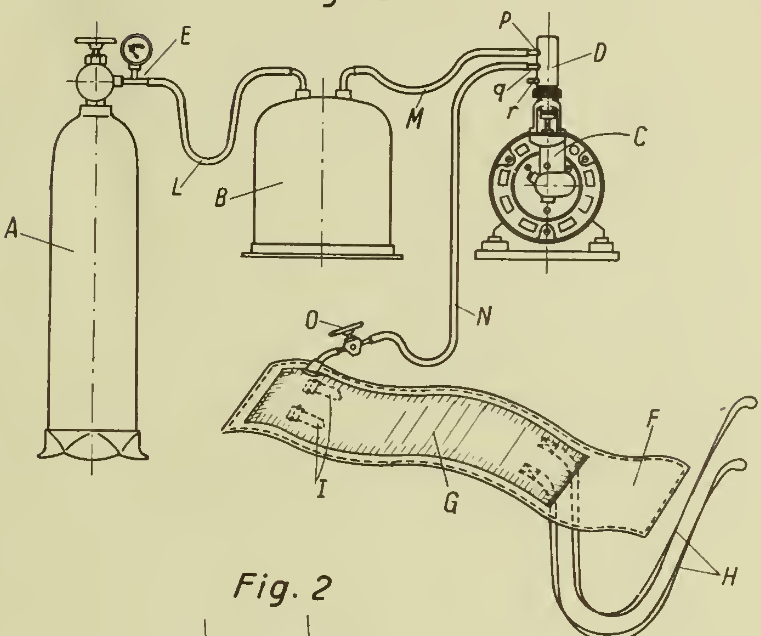


Fig. 2

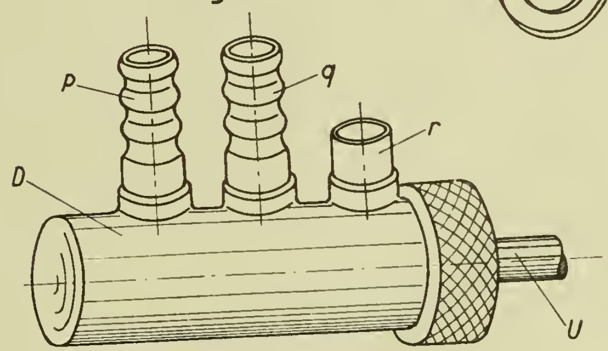
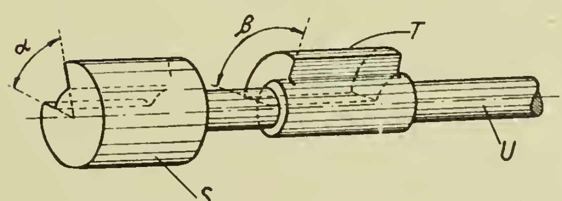


Fig. 3



INVENTOR

Elettra Diena nee Bruno

BY

ATTORNEY

Published May 11, 1943

Serial No. 348,726

ALIEN PROPERTY CUSTODIAN

INTERNAL COMBUSTION ENGINES

Max Hurst, Stuttgart, Germany; vested in the Alien Property Custodian

Application filed July 31, 1940

This invention relates to an injection system for multi-cylinder internal combustion engines in which the distribution of fuel is controlled by the compression of the air in the engine cylinders.

In the known internal combustion engines of the fuel injection type in which the air compression in the engine cylinders is made use of for controlling the injection nozzles the beginning of injection is determined by the compression pressure. As this pressure of the compressed air is subject to fluctuations, the beginning of injection is irregular and the known proposals are impracticable.

According to the invention, the beginning of injection is determined by a mechanically driven injection pump and the compression pressure in the cylinders acts so to speak as preselector for making sure that the successive injection operations of the pump are applied to the respective nozzles in proper order. This is done by connecting the outlet of a single cylinder injection pump performing one delivery stroke for each working stroke of the engine with the various nozzles by a correspondingly branched pressure piping and interposed shut-off members which are so controlled by the compression pressure developed in the associated cylinder that the fuel supplied by the pump at each stroke can be injected only into the cylinder whose piston performs the next power stroke.

Three embodiments of the invention are diagrammatically illustrated in the accompanying drawing, in which

Figure 1 shows an injection system according to the invention for a four cylinder internal combustion engine of the four stroke cycle type;

Fig. 2 shows an injection valve differing from the one shown in Fig. 1; and

Fig. 3 another form of injection valve with shut-off means.

1 designates an injection pump, partly shown in section, whose piston **2** forces at each stroke a regulatable amount of fuel into a piping **3**, regulation being effected in known manner by turning the piston having an inclined control face. The piping **3** is divided into pipings **4***a*, **4***b* which in turn branch off into conduits **5***a*, **5***b*, **5***c*, **5***d* which lead to the injection valves. For each cylinder Z an injection valve is provided comprising a casing **6** possessing a through-going longitudinal bore **7** in which a slide **8** moves having part of its length perforated as indicated by **9**. This longitudinal bore **9** opens at its lower end into injection holes **11** in a head **10**, and the upper end thereof meets a cross-bore **12** of the slide **8**. At the end of the slide **8** averted from the injection side a collar **13** is pressed by a spring **14** upon a shoulder **15** of the casing **6**. At this position, the lower end of the slide **8** extends as shown with the head **10** into the space of the cylinder Z, so that the portion of the slide **8** above the cross-bore **12** covers the opening **16** of the conduit **5**.

When one of the pistons **17** during its compression stroke approaches its upper dead center, the compression pressure, against the action of the spring **14**, will move the slide **8** up until the head **10** abuts against the casing **6**. At this position, the cross-bore **12** will be on a level with the opening **16**, so that the nozzle opening is in communication with the pressure piping **3**, **4**, **5**. During the following delivery stroke of the injection pump **1** fuel is injected into the cylinder whose charge is compressed.

As the engine shown in Fig. 1 is of the four cylinder four stroke cycle type, two cylinders require fuel at each revolution of the crankshaft. The pump shaft driven by the engine at crankshaft speed is provided with a double cam **18**, i. e. a cam having two operating edges, so that the piston of the pump carries out two suction and pressure strokes at each revolution of the shaft.

In case of a four cylinder two stroke cycle engine, either the double cam of the injection pump would have to move twice as fast as the crankshaft or, if the pump shaft is to move at the same speed as the crankshaft of the engine, a cam having four operating edges would be required with the throws of the cranks displaced 90° relative to one another.

The injection valve shown in Fig. 2 differs from the one shown in Fig. 1 in that the injection holes **11** are provided in the valve casing **6** and not in the slide. The slide valve **19** subjected to the compression pressure and also to the retractive force of a spring **14** merely controls the communication of the pressure piping with a channel **20** in the casing **6**, which remains established as long as the slide **19** is forced up by the compression pressure.

The injection valve shown in Fig. 3 possesses a jet needle **21** whose shoulder **22** is subject to the fuel pressure prevailing in the piping **3**, **4**, **5** and tending to force the needle **21** from its seat in opening direction against the action of an initially tensioned closing spring **23**. This tendency is enhanced by the compression pressure which, developing in a cylinder, is transmitted

through a channel 24 to an annular space 25 and there applied to a shoulder 26 provided at the transition of the needle stem to a collar 27.

In a multicylinder internal combustion engine fitted with injection valves according to the invention fuel will come out of the valve of that cylinder only which, through its compression pressure, supplements the opening motion of the needle concerned, provided conditions are such that the pressure developing at each injection is by itself unable to lift the needles. In the construction shown in Fig. 3 a closed nozzle is used whilst Figs. 1 and 2 show open hole nozzles. The latter could of course be readily replaced by closed nozzles by disposing in the section of the piping between the slide and the nozzle opening any suitable type of valve capable of being opened by the pressure produced by the pump against the action of a closing force.

MAX HURST.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. HURST
INTERNAL COMBUSTION ENGINES
Filed July 31, 1940

Serial No.
348,726

Fig. 2

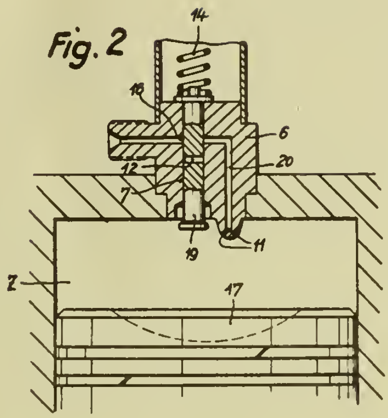
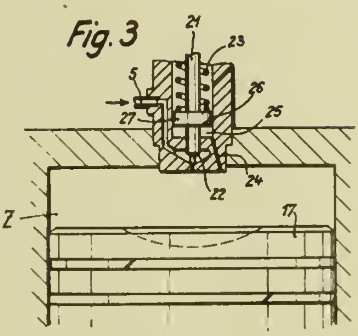
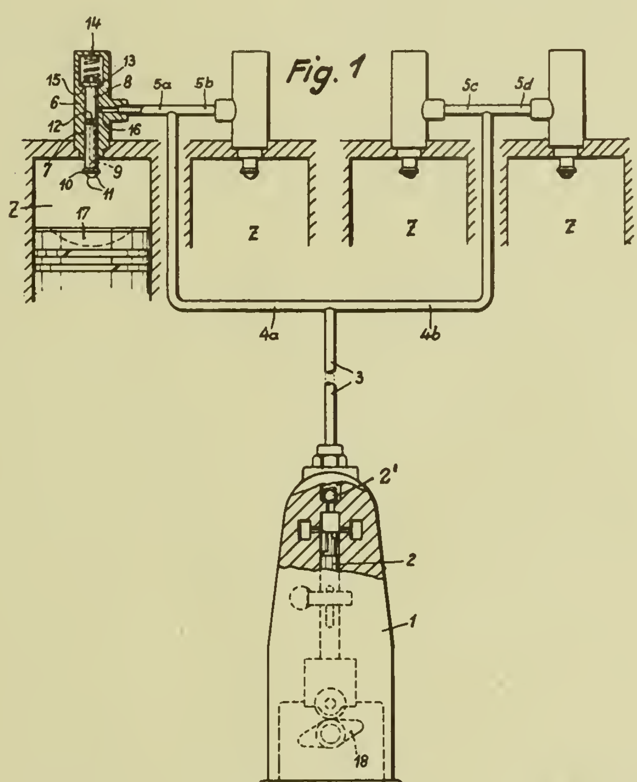


Fig. 3





Inventor
Max Hurst
By
Atty

Published May 11, 1943 Serial No. 348,782

ALIEN PROPERTY CUSTODIAN

LIQUID FUEL INJECTION SYSTEM FOR MULTICYLINDER INTERNAL COMBUSTION ENGINES

Willy Voit, Stuttgart, Germany; vested in the Alien Property Custodian

Application filed July 31, 1940

This invention relates to an injection system for multicylinder internal combustion engines in which the distribution of fuel is electromagnetically controlled.

In engines of this class an injection pump can be adjusted to deliver different amounts of fuel to a pressure piping common to a plurality of injection nozzles, and the fuel passes from this piping through one of the nozzles, successively electromagnetically controlled by a distributor, into the associated cylinder.

According to the invention, the distributor preselects a nozzle independently of the amount to be injected, and this nozzle is kept open by its associated magnet at least during the injecting period.

Two embodiments of the invention are illustrated in the accompanying drawing, in which

Figure 1 is a diagrammatic view of the total arrangement of an injection system according to the invention in an internal combustion engine;

Fig. 2 is a view of a slide valve arranged in the fuel supply piping;

Fig. 3 is a wiring diagram of the electrical members of the system; and

Fig. 4 is a view, partly in section, of an injection nozzle provided with locking means for the needle.

1 designates a four cylinder four stroke cycle internal combustion engine whose crankshaft 2 drives an injection pump 3 by means of a pair of gears 4 in such manner that the shaft 5 of the pump 3 rotates at half the speed of the crankshaft 2. A cam 6 disposed on the shaft 5 has four elevations, not shown, so that the piston 7, shown in broken lines, of the pump 3 carries out four delivery strokes at each rotation of the shaft 5. The amount of fuel supplied at each stroke to a pressure piping 8 communicating with the pump outlet is regulated in known manner by the displacement of a rod 9. The piping 8 has branches leading to various nozzles 10 disposed in the engine cylinders, and in each branch of the piping 8, in front of each nozzle 10, a shut-off member 11 is provided. Attached to the injection pump 3 is an electric distributor 12 whose revolving finger 13 is driven from the pump shaft 5 and passes over four contacts 14 at each revolution. From each of these contacts 14 an electric conductor 15 leads to one end of the winding of a field coil 16 provided in each shut-off member 11, the other end of the winding being earthed.

The shut-off member, clearly visible in Fig. 2, comprises a casing 17 made of magnetizable material and provided with a blind bore 18 in which a slide valve 19 is guided possessing a transverse bore 20. A spring 22 tends to force the slide 19, also made of magnetizable material, upon the bottom of the blind bore 18. An extension of the bore 18 accommodates the coil 16 whose core 21 is firmly united with the slide 19. When current flows through the coil 16, its core 21 is lifted and the slide 19 firmly connected thereto passes into a position at which its cross-bore 20 is on a level with a continuous transverse bore of the casing 17, with which the branch of the pressure piping 8 interrupted by the shut-off member is in communication, so that fuel can enter the nozzle 10 connecting with the end of this branch.

The circuit of each coil 16 controlled by the distributor 12 is closed at least during the injecting period so as to permit the flow of fuel to each nozzle 10.

Fig. 3 indicates the connections and the control of the coils for the shut-off members of the various nozzles 10. The quantity and the beginning of injection are determined, however, by the injection pump, so that the distributor 12 in establishing communication between a branch of the pressure piping 8 and a nozzle 10 through which fuel is to be injected merely performs a preselecting function.

Fig. 4 shows a shut-off member in connection with the nozzle. In the nozzle body 23 a needle 24 is guided, and a spring 29 tends to hold the needle 24 in its closed position shown. Over the upper end of the needle 24 a pin 25 guided in the nozzle body 23 is pushed vertically to the needle by a spring 26, and fuel entering at this position through a channel 27 in response to the pressure of the injection pump 3 is therefore unable to lift the needle 24. The other end of the pin 25 is placed in a field coil 28. When current flows through the coil 28, the pin 25 acting as magnet core is drawn into the coil against the action of the spring 26, and an impulse coming from the pump can now lift the needle 24. The control of the current impulses for the coils of each nozzle is effected also by the distributor 12.

In the examples shown only one coil is excited, namely that whose nozzle is selected for injection, and the coils of the other nozzles remain currentless. It is possible, however, to reverse conditions by utilizing the excitation of the coils for locking their associated nozzles and interrupting the exciting current only for the coil through whose nozzle an injection is to be made. In this case, the consumption of current would, however, be materially greater than in the construction shown.

WILLY VOIT.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

W. VOIT

LIQUID FUEL INJECTION SYSTEM FOR MULTICYLINDER INTERNAL COMBUSTION ENGINES

Filed July 31, 1940

Serial No. 348,782

Fig.1

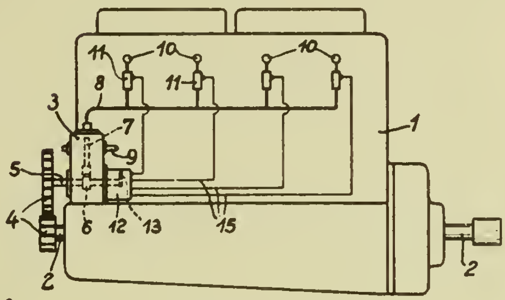


Fig.2

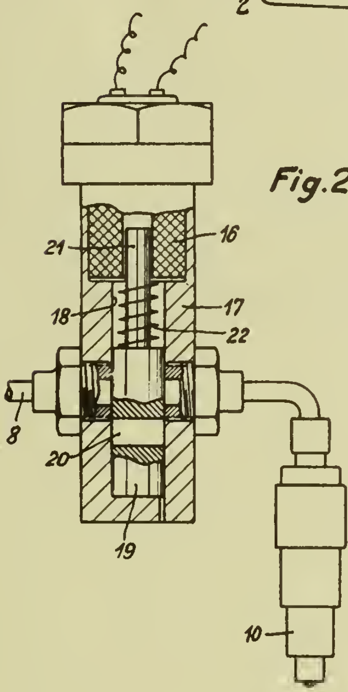


Fig.4

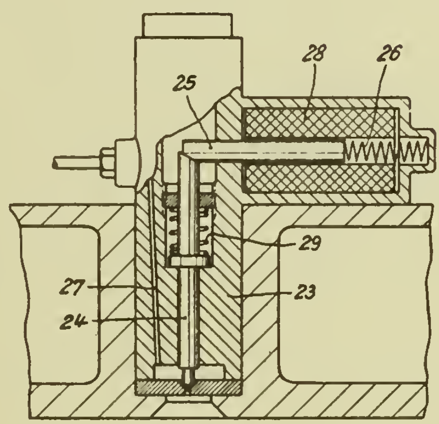
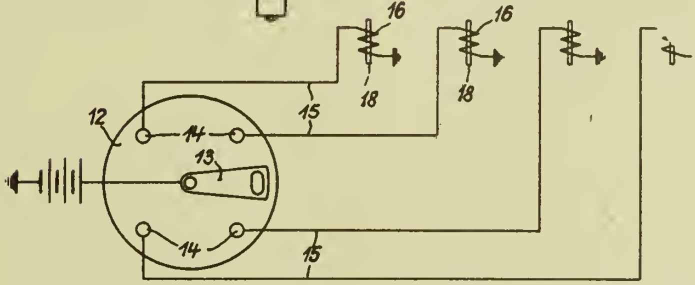


Fig.3



Inventor

Willy Voit

By [illegible]

Atty

Published May 11, 1943

Serial No. 348,896

ALIEN PROPERTY CUSTODIAN

ELECTROMAGNETIC TRANSPORT DEVICE

André Lucien Dauphin, Paris, France; vested in the Alien Property Custodian

Application filed July 31, 1940

This invention relates to an electromagnetic transport device, more particularly intended for the rapid transport over any distance of light freight and especially mail, by electromagnetic propulsion.

The problem of the rapid transport of the mail is as yet only imperfectly solved. The most rapid means (aeroplanes) cannot ensure a constant flow and always necessitate a transfer from the point of arrival to the distribution centre.

The pneumatic tube system employed in large towns where the network is dense, easily superintended and of small capacity, is not applicable to long distances or to large diameters.

The electromagnetic propelling device patented by the applicant is perfectly adaptable to the solution of this problem by means of a certain number of improvements.

However, it follows that the construction must be different according to whether it is a question of transporting light mail at a very high speed (50 to 100 meters/sec.) and over very great distances, or of transporting heavy and bulky loads (standard mail bags) for a short distance such as from an aerodrome to a distribution centre and at low speeds (20 to 25 meters/sec.).

The first application necessitates a tight tube which can be placed in a trench or in a duct or even in the open air. It necessitates magnetically controlled automatic switch points, good contacts without material contact with the movable bodies, an automatic block system etc., all these arrangements being obtained by the present invention.

The principle of the system which is known in itself is as follows:

If a magnetic core is assumed to be about to pass into a solenoid, and if the said core itself by its movement causes a current to be passed through the solenoid, it will be attracted with an increasing force up to the point where the magnetic circuit with the outer framework is closed and the attraction will disappear.

However, if in arriving at this point (taking into account the self-inductance of the winding) the core itself by its movement cuts off the current through the solenoid, it will continue in its course owing to inertia, assuming it to be suitably guided.

If a second solenoid is met under the same conditions a fresh impulse may be imparted to the core.

According to the energy and the frequency of these impulses, taking into account the passive resistances, it will acquire an accelerated movement or a continuous movement.

The case can now be considered where instead of a single magnetic core there is a train composed of any number of cores which are magnetically separate but mechanically coupled.

If this train passes through a series of suitably spaced solenoids the impulses will succeed one another so as to constitute a practically continuous drive and the train can move at any speed determined by the power expended on the one hand, by the passive resistance, on the other hand, and in a subordinate way by the switching conditions, time constant of the solenoids, etc.

It follows that according to the particular conditions of application and for the purpose of reducing the initial cost, solenoids which are more widely spaced and of greater power can be used, thus utilizing the momentum of the train, to ensure the drive by a succession of spaced impulses. The algebraic sum of the driving impulses and the resistances to motion must, of course, be positive at any moment.

The device according to the invention comprises in combination suitable solenoids of suitable dimensions provided with switching apparatus and locomotor elements which themselves constitute, and through the auxiliary transport members with which they can be combined, a core for the solenoids the latter being suitably arranged on a suitable supporting and guiding track which also comprises suitable magnetic braking and safety devices, preferably operating automatically, with the object of obtaining a high-speed transport assembly permitting a considerable traffic.

The accompanying drawings show the construction according to the invention of a device intended to be used for the transport of mail bags between given stations.

In the drawings:

Fig. 1 is a view of an assembly of a train used according to the invention;

Fig. 2 is a half section with half external view of a solenoid mounted on the track;

Fig. 3 is a vertical section of Fig. 2 along the line III—III.

Fig. 4 is an end view of Fig. 2 along the line IV—IV of Fig. 2;

Fig. 5 is a plan of Fig. 2;

Fig. 6 is an elevation with partial section of a locomotor element,

Fig. 7 is an end view partly broken away;

Fig. 8 is a section along the line VIII—VIII of Fig. 6;

Fig. 9 is a plan view of Fig. 6;

Fig. 10 is a diagram of the electrical connections of each solenoid;

Figs. 11, 12, 13 show modifications of Fig. 10,

Fig. 14 is a diagrammatic view of a cut-out located in the connections of the coil,

Figs. 15, 16 are diagrammatic views showing a plan view and a longitudinal section respectively of a station,

Figs. 17, 18 are a longitudinal elevation and a cross-section respectively of a locomotor in an opened position;

Fig. 19 is an elevation of a transport vehicle intended to be inserted between locomotors according to Fig. 6.

The complete device comprises three principal elements which are the solenoids, the switching apparatus and the locomotors, and accessory elements such as the track, the transport trolleys and the safety devices.

Each solenoid (Figs. 2 to 5) consists of an annular winding of a diameter suitable for the calibre of the device. This winding can consist of a single coil or, as in the preferred embodiment shown in Fig. 2, several coil sections (two in number in said embodiment) such as **1** and **2** connected in series and suitably insulated conforming to the dimensions of the assembly. The simple or multiple coil is enclosed in a laminated magnetic framework forming a casing and assembled by bronze members such as **4** and **5**; said framework receives the track elements **26**.

The area of the section of iron of the said magnetic framework is such that the iron is not saturated in any case. Under these conditions the surfaces of the armatures are surfaces of magnetic level in which the lines of force must normally terminate.

As the driving reaction acts on the magnetic framework the assembly is calculated mechanically in proportion to these reactions:

As clearly shown in the Figures 2 to 5 of the drawings, the whole is concentrated and constructed to reduce to a minimum the dispersion of the lines of force in accordance with the known processes.

The internal diameter of the magnetic ring is determined so as to reduce the air gap to a minimum when the magnetic circuit is closed by the core of the locomotor, which is described hereafter this necessitating a very accurate guiding obtained as indicated hereinafter in the description relating to the track.

The iron plates are suitably notched as by **23**, **27**, **28** to allow free passage for the switch rails **7**, **8**, guide rails **20** and bearing rails **26** respectively. In order that the said rails do not form a magnetic short-circuit, said rails will comprise sections of rail constructed of non-magnetic metal. It would also be possible to use steel rails by providing by notching air gaps which are appreciably greater than the normal air gap, according to the conditions of construction.

In view of their mass, the surface of dispersion and the extremely short time during which a current passes (of the order of 100th of a second) the question of overheating in normal service does not arise. In case of accidents causing the circuit to be closed for a considerable time the circuit is automatically broken by a fuse **29** (Fig. 11) or by a cut-out **30** (Fig. 12) having a retarded action.

As relatively high currents are used the question of switching is of considerable importance and conditions the operation of the device insofar as practical operation continues.

Thus in a system comprising a train of 3,000 kgs. driven at a speed of 25 meters/sec. the peak current may reach 300 amperes at 600 volts. As this current is instantaneous (of the order of 100th of a second) the questions of self-inductance, time constant of the windings and the breaking of the current, give rise to problems the solution of which constitutes one of the characteristics of the invention.

This solution is theoretical and practical and is obtained as follows:

One of the ends of the winding of each of the solenoids **1**, **2** is directly connected to one of the supply lines, for example **6** (Fig. 10). At any suitable point of the inner circumference of each solenoid, preferably at the upper part, are placed two rail elements for switching shown at **7** and **8** in Figs. 2–4. These rails are constructed of a metal which is non-magnetic and which is a good conductor of electricity, such as for example copper, bronze or other material, and are separated by a distance which is sufficient to avoid the formation of arcs between the said rails in view of the supply voltage adopted.

One of the rails, for example **7**, is directly connected to the other supply line **9**, the other rail **8** being connected to the second end of the winding **1**, **2**, as shown in Fig. 10.

It can therefore be seen that in order to energize the solenoid **1—2** it is necessary and sufficient for the circuit between the two rails **7—8** to be closed by means of a special part carried by the movable body. Among other advantages this arrangement has the advantage that no part of the train (with the exception of the insulated slider which is described below) serves as a conductor for the current and neither the rails nor the earth form part of the circuit, thus excluding all risk of fire breaking out in the transported freight.

Each of the solenoids is connected up only through the medium of the protecting and cutout devices such as **29** (Fig. 11) and **30** (Fig. 12) by means of which a solenoid can be disconnected for repairs without interrupting the traffic.

In order to make the most use of the solenoid it is important that the useful current intensity, that is to say the intensity at the moment when the magnetic core passes into the magnetic field, is the maximum intensity provided for while taking into account solely the ohmic resistance of the winding.

As it is here a question of instantaneous currents the winding has a considerable self-inductance which slows up the passage of the current and this "time constant" has an appreciable value which may reach several hundredths of a second. It is therefore important for the switch rails to be suitably extended in order that the slider of the movable body shall close the circuit before the core passes into the solenoid.

The length of this extension is determined by the time constant of the windings and the speed at which the movable body is propelled. An insufficient length will reduce the magneto-motive action and an exaggerated length will reduce the output of energy and will be capable of causing an unnecessary overheating.

The breaking in an inductive circuit of an instantaneous current of such strength presents considerable difficulties in an apparatus where the current is very frequently interrupted unless relays are employed the complication and sensi-

tiveness of which will appreciably reduce the advantages of the device.

In order to avoid these disadvantages the magnetic circuits are dimensioned so that at any moment of the total closing of the magnetic circuit (core centred in the solenoid) the back electromotive force due to the movement considerably reduces the current strength. In this way in the example cited above, when the peak current strength is of the order of 300 amperes the current on breaking the circuit is only 15 amperes.

However, by way of supplementary precaution the ends of the switch rails are provided with points 40—40, 41—41 (Figs. 2, 5) graphite or equivalent material forming a spark arrestor for the double purpose of avoiding the over-voltages which are harmful to the windings and of allowing an easy maintenance without changing the assembly of the rail.

The abovementioned arrangement is applied to double track conveyors operating in some sort of closed circuit, but the device is equally applicable to "shuttle" services run with single track conveyors.

In this case there are three switch rails (Fig. 13) the central rail 31 connected to the solenoid 1—2 and to the supply line 36 being of double length, in order to ensure the advance contact in both directions of running. The side rails 32—33 carried in front and at the rear are each connected to a different supply line 34—35 respectively which can be connected up from the central plant.

In order to reverse the direction of a train it is therefore sufficient to change the slider and to connect one or the other of the supply lines 34—35 to the generator not shown in the drawing.

The device comprises propelling solenoids and also braking solenoids intended to slow up the speed of the train on arrival at a station.

The switching conditions are here quite different since the magneto-motive action must have effect only when the magnetic circuit is closed and the current must be broken during the opening of the magnetic circuit.

The efficiency of the solenoid is then extremely reduced since the maximum self-inductance during the passing of the current considerably reduces the current strength used, and since the circuit is broken at a peak current without any counter action due to the back electro-motive force. As this counter action is moreover inversely proportional to the speed of the train it will entirely disappear when the train is stationary.

This disadvantage is overcome by the following device (Fig. 14). The switch rails 7, 8 are arranged and dimensioned so that the circuit is closed through the winding 1—2 when the core is centred therein but at the same time a current is passed through the coil 37 of a cut-out 38 and the latter closes, the resistance and the self-inductance of the operating coil 37 of the cut-out 38 being negligible relatively to those of the solenoid 1—2. Under these conditions the passing of a current through the solenoid 1—2 is not influenced by the delay in the closing of the cut-out this being indispensable.

On the contrary, at the end of the outward course of the core the cut-out 38 will open only after the slider 39 has left the switch rails 7—8 and under these conditions the slider 39 will not have to break any current since it will be short-circuited by the cut-out 38 when it leaves the rails 7—8.

The peak current during the outward course at low speeds (less than 10 meters/sec.) could appreciably exceed the allowable instantaneous overload for the generators. Non-inductive resistances 42 (Figs. 15, 16) are therefore provided in series with the braking solenoids 43, these resistances being determined in accordance with the characteristics of the solenoids.

Normally the braking will be assisted by passing up a slope 44 (Fig. 16) in the direction of arrow F, it being assumed that every station such as 45 (Figs. 15, 16) is at a higher level than the track, and in the same way starting up will take place on descending the slope 44 in the direction of arrow F_1 in order that the train will arrive at the first solenoids with a speed of at least 5 meters/sec. However, this arrangement is not essential to the operation of the device but appreciably facilitates its operation.

The locomotor is one of the two essential parts of the device since it is this part which ensures the driving of the train assembly when it receives the magneto-motive action of the solenoid and at the same time it has to make the driving contacts.

Every locomotor comprises a magnetic ring 10 (Figs. 6 and 8) consisting of two radially arranged iron plates (parallel to the lines of force). This ring which is preferably of a general cylindrical shape, can have flat portions, such as 11 (Fig. 8), for the passage of the points, and recesses, such as 12 (Figs. 7, 8), for housing the switch rails.

The external diameter of this ring is directly proportional to the internal diameter of the solenoid (Figs. 2 to 4) in order to maintain the air gap provided for. The length of the ring is the least equal to that of the solenoid measured between the outer plates of the cheeks 3.

The ring 10 is mounted on a suitable frame of a light non-magnetic metal extended by streamlined portions 13, 14, likewise of light non-magnetic metal and of suitable shape. Spring hooks 15 and bearings rings 16 allow the various elements to be connected up to form a train.

The locomotor comprises two bogies 17 and 18 mounted resiliently but with a small amount of play and guiding is completed by four rollers 19 (Figs. 6 and 9) which bear on guide rails 20 (Fig. 3).

The rollers are placed above the horizontal diameter at an angle which is determined by the profile of the line in order to balance the mean resultant of the reactions due to curves in both perpendicular planes.

The locomotor can be opened for loading for instance by raising the entire upper casing 46 which raising may be operated by means of a pulley block 47 of any desired construction, and which may be for instance a pneumatic pulley block, secured on a convenient frame 48. It would also be possible to open said locomotor in any other way, for instance, by opening trap doors (not shown in the drawings) in the streamlined portion, according to the nature and dimensions of the freight to be transported.

The locomotor carries at its upper part contact sliders each comprising a resilient parallelogram 20^a (Figs. 6 and 7) which has at its end two joined straight bars 21 which are suitably insulated from the body. These bars of a metal which is a good conductor close the circuit between the switch rails. Thus a current cannot in any case pass through the locomotor.

When the train has to travel in both directions

(single track or point terminus) there are two sliders **21** one at each end of the locomotor, as shown in Fig. 6, a mechanical locking gear not shown in the drawing preventing them from being raised at the same time.

In the case of a double track and loop terminus as in Figs. 16, 17, the train always travels in the same direction and a single slider is sufficient.

It follows that as the sliders are located on the streamlined portion the latter is suitably arranged to allow a very small clearance.

A suitable curvature of the ends of the switch rails **7**, **8** and of the contact bar **21** of the slider allows a contact to be made without shock at the speed under consideration.

Trolleys **25** are interposed between the locomotors at the rate of n—**1** trolleys for n locomotors. The length is determined by the freight to be transported and at the same time by the spacing between the solenoids and can be variable according to whether the train runs with continuous drive or with discontinuous drive.

They are constructed of a light metal, for example of the shape shown in Fig. 19, supported if necessary by one or two bogies **22**, and shaped at their ends at **24** so as to fit exactly the ends of the locomotors.

The train thus forms a cylinder scarcely undulated and without any break of continuity, ensuring the minimum of resistance to its motion and carried by the track **26**.

The trolleys can have a diameter less than that of the locomotors in order to escape the switch rails.

The track assembly consisting of rails, points, etc. . . . does not differ at all from the present railway material. Its spacing is mainly equal to the radius of the magnetic cylinder but it can differ therefrom without disadvantage according to the conditions of stability. The rails are supported by the elements of the trussed girder which itself constitutes the "tube."

At the terminus the track can either describe a loop (Figs. 15 and 16) of radius proportional to the length of the trains (loop terminus) or the two tracks can be joined to form a single track (point terminus) according to the extent of the traffic provided for.

It follows that the trains cannot be manoeuvred at a station under the action of the solenoids. This manoeuvring can be effected by means of suitable auxiliary motors which will be of any convenient type and conveniently arranged at the end stations.

In the case of multiple lines comprising main tracks and additional or secondary tracks, a security device will be preferably arranged, said device comprising a convenient block system protecting every junction, for instance by means of additional contacts controlling by the aid of relays solenoids which act upon rolling trains by blocking same or otherwise.

The several manoeuvres will be controlled for instance from a central station, for instance by means of emissions of modulated current or having a special frequency, or by means of interrupted current according to a determined rythm, said rythm being for instance determined by indications given for instance by a perforated film which unrolls at a speed corresponding to the speed of trains.

Any other device may, of course, be used for the same purpose.

The invention is applicable to the rapid transport of any suitable matter or substance and more particularly mails, and the transport can be effected either on the surface or underground. The track can be constructed in any suitable manner.

ANDRÉ LUCIEN DAUPHIN.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

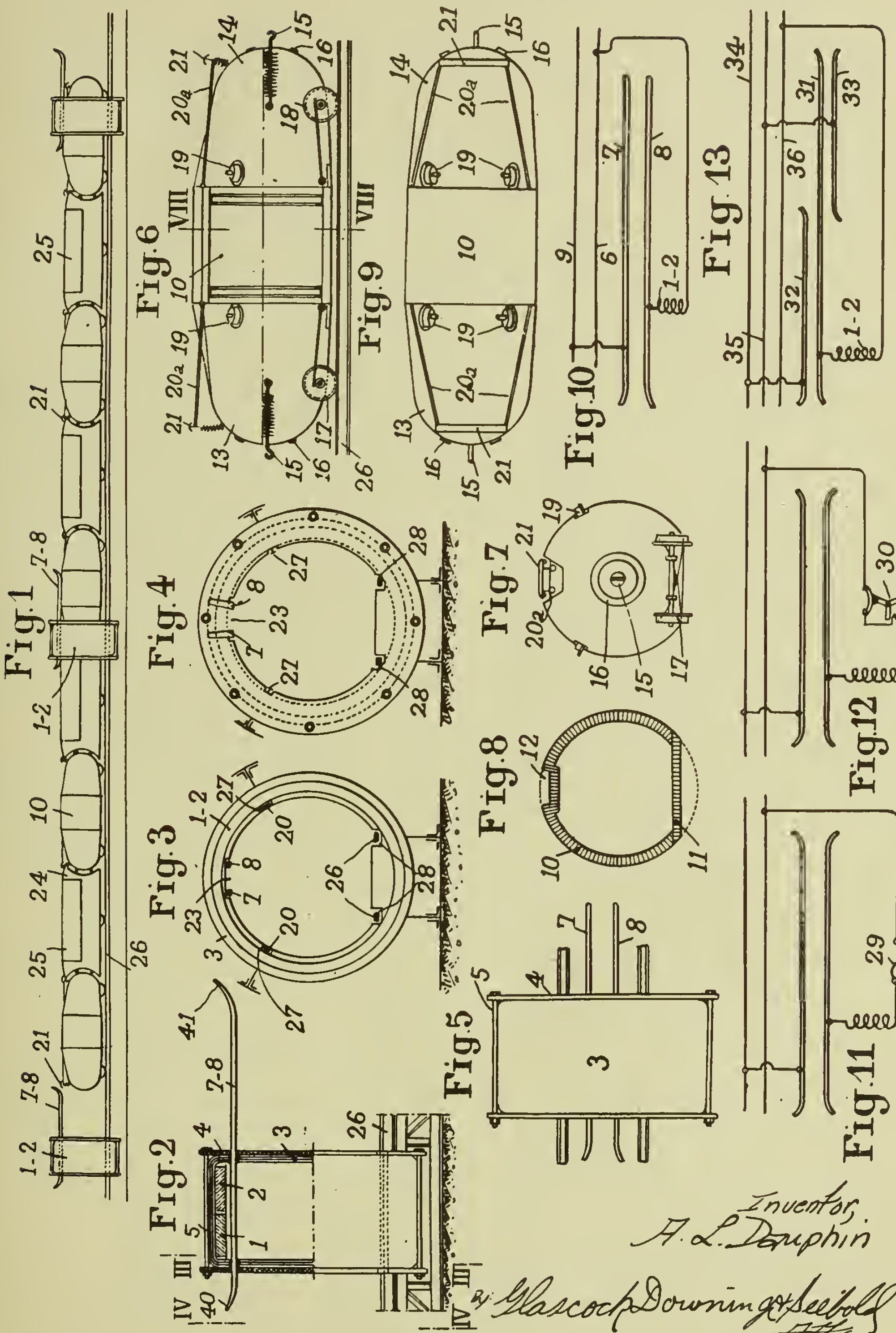
A. L. DAUPHIN

ELECTROMAGNETIC TRANSPORT DEVICE

Filed July 31, 1940

Serial No. 348,896

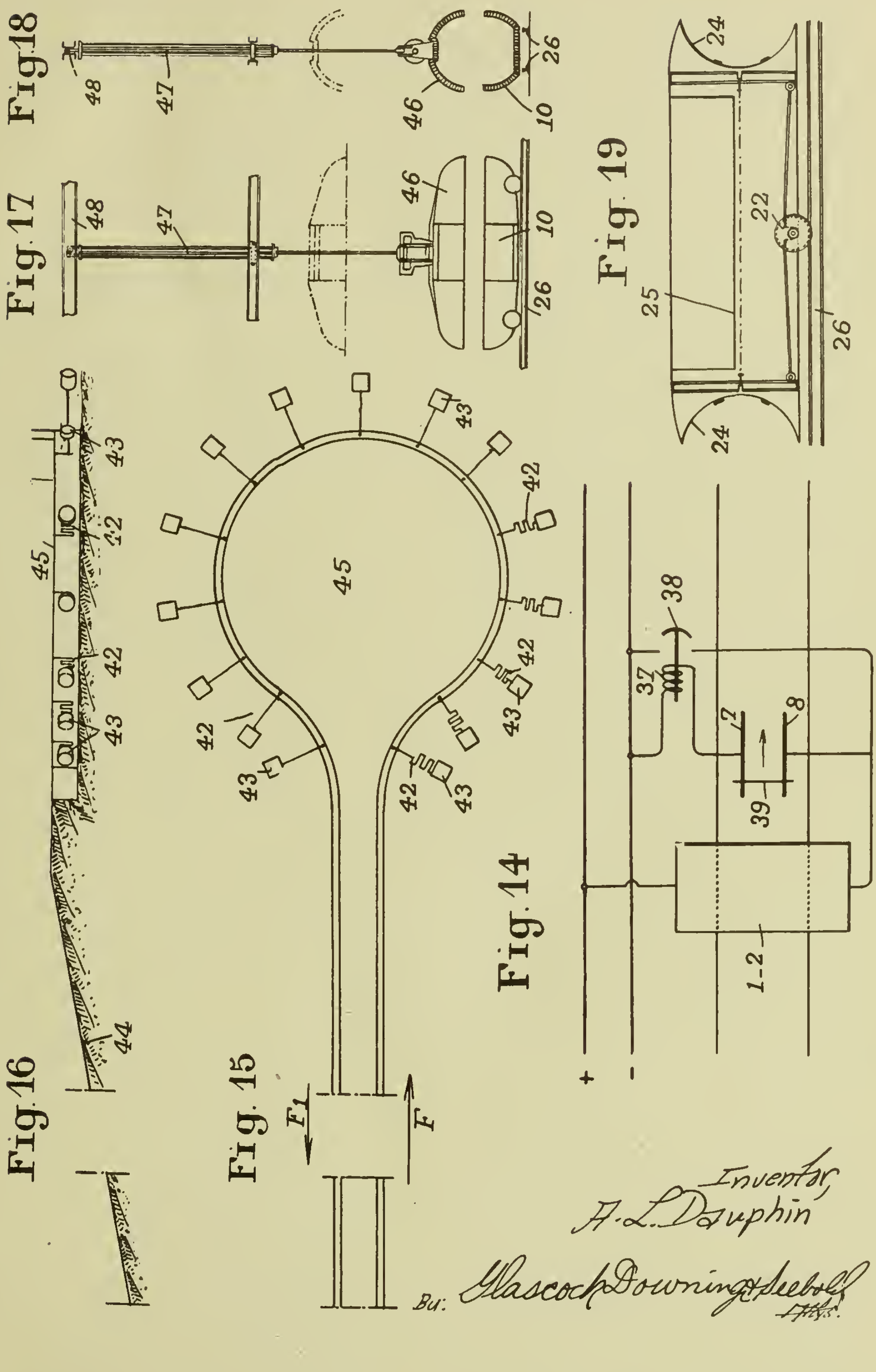
2 Sheets-Sheet 1



PUBLISHED
MAY 11, 1943.
BY A. P. C

A. L. DAUPHIN
ELECTROMAGNETIC TRANSPORT DEVICE
Filed July 31, 1940

Serial No.
348,896
2 Sheets-Sheet 2



Published May 11, 1943 Serial No. 349,853

ALIEN PROPERTY CUSTODIAN

HIGH PRESSURE STEAM GENERATOR

Walter Bredtschneider, Berlin-Charlottenburg, Germany; vested in the Alien Property Custodian

Application filed August 2, 1940

As is well known feed water is evaporated in the drums of Löffler boilers by admitting superheated steam into said drums and distributing this superheated steam, by means of nozzles, as uniformly as possible over the entire water space of the drums. Hereby, the superheating heat of the hot steam is transferred to the water in the drum and generates fresh steam which is withdrawn together with the steam blown in and cooled to the temperature of saturated steam. The water level in the drums is maintained by the admission of fresh feed water. The impurities present in the feed water remain in the boiler drums and gradually enrich more and more in the water of the drum.

If too high an enrichment would occur the steam to be consumed would carry impurities and, therefore, the concentration in the boiler drums must be limited. This is effected by removing a portion of the boiler water containing salts, impurities and so on. To maintain as low as possible the quantity of this water containing the salts, impurities and so on efforts must be made to remove the water from the drums at a point at which enrichment is largest.

As usual the fresh feed water is supplied at the one side or the one end of the drums. While flowing through the drums in the longitudinal direction of same the feed water is progressively evaporated and the impurities are correspondingly enriched more and more in the direction of flow until the highest concentration is reached at the end of the drums opposite to that at which feed water is supplied. To limit this concentration the water containing the salts, impurities etc. is withdrawn at this piont.

If a Löffler boiler is provided with two or more boiler drums, care is to be taken that the water level is of equal height in all the drums even if the feed water supply and the evaporation are not exactly identical in all drums. Therefore, the drums are connected with water compensating pipes by means of which the surplus water not evaporated may flow over from one drum into the other drum or drums. This results in a water sided connection of the Löffler boiler drums as shown in Fig. 1 of the drawing. The arrangement of the boiler drums shown in this figure corresponds to known constructions. The feed water is admitted into the evaporator drums **1** and **2**, flows through these drums in the longitudinal direction of same and is enriched more and more with salts, impurities etc. The highest concentration is reached at the other end of the drum. The removal of salts, impurities etc. is effected at this end of the drums by the valves **3**. Furthermore, the surplus water of one drum is transferred at this point by way of the compensating pipe **4** to the other drum.

In connection with boilers of this construction certain impurities have permanently been ascertained in the steam for the presence of which no explanation could be obtained from the concentration of the boiler water ascertained in the water containing the salts, impurities etc. An increase of the quantity of the water containing the salts, impurities etc. withdrawn from the boiler drums resulted in a reduction of the concentration in the water containing the salts, impurities etc. but impurities still were present in the steam.

A remedy was obtained by the present invention which is based on the following knowledge:

If in a boiler having a plurality of drums the supply of feed water into the individual drums or the steam generation in said drums is not exactly identical, boiler water flows by way of compensating pipes from one drum into the other. Therefore, water to be evaporated is admitted at both ends into the drum into which water is supplied from the other drum, i. e on the one hand by way of the feed water pipe and on the other hand by way of the compensating pipe. The result of this is that a zone of stagnating water is formed within the drum and that at this point, due to the evaporation, the impurities are enriched to an unlimited and uncontrollable degree. By way of the pipe removing salts, impurities etc. substantially only the water flowing over from the other drum is removed and not the water having the highest concentration. An increase of the amount of the water containing the salts, impurities etc. results in some displacement of the critical zone within the drum only, but removal of the water of the highest concentration is not obtained.

This knowledge is utilized according to the present invention by the fact that not the surplus water of one drum, already enriched with impurities during evaporation, is transferred by way of compensating pipes to the other drum, but that the compensating pipes only transfer fresh feed water from one drum to the other. This substantially is obtained by arranging the mouths of the compensating pipes at the same side or end of the drum as the mouths of the feed water pipes. Due to this arrangement fresh feed water only flows into all drums at one end thereof and the water positively flows through the drums in the longitudinal direction thereof.

At the end of the flow highest concentration is obtained in each drum and at this point removal of the salts, impurities etc. is effected.

An example of the arrangement according to the invention is shown in Fig. 2. The feed water is admitted at 2 into the drums 1 and the valves 3 removing the salts, impurities etc. are provided at the other end of the drums. To compensate the water level compensating pipes 4 are arranged at the side or end of the drums at which feed water is admitted so that by way of these pipes fresh feed water only may flow over from one drum into the other.

If for constructional or other reasons the arrangement of the compensating pipes 4 at the side of feed water supply 2 offers difficulties, the arrangement may be as shown in Fig. 3. According to this modification the compensating pipes 4 are provided at the opposite end of the drums and are extended within the drums 1 by special pipes 5 as far as to the neighborhood of the end of feed water admission.

With an arrangement of the feed water supply 2 and the valves 3 removing the salts, impurities etc. at one end of the drums and the compensating pipes 4 at the other end as shown in Fig. 4, the feed water is conducted by way of pipes or channels 6 through the drums to the end of the compensating pipes 4 before being admitted to the boiler water.

WALTER BREDTSCHNEIDER.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. BREDTSCHNEIDER
HIGH PRESSURE STEAM GENERATOR
Filed Aug. 2, 1940

Serial No.
349,853

Fig.1

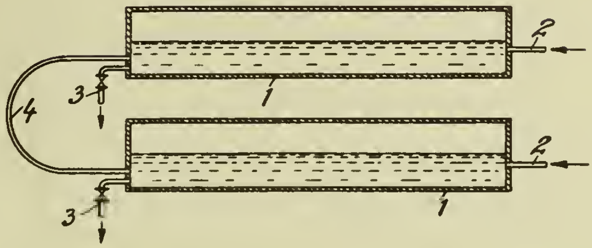


Fig.2

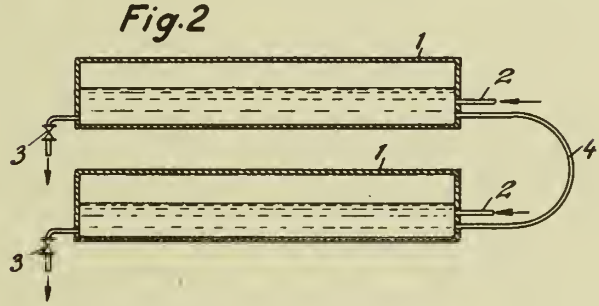


Fig.3

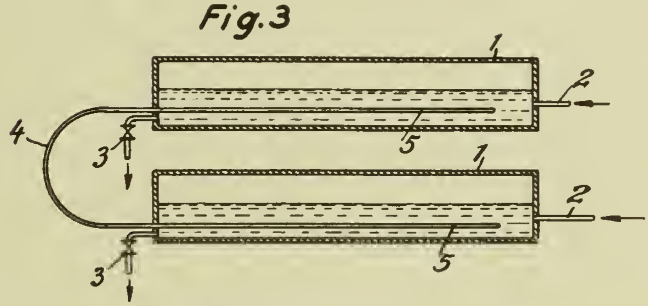
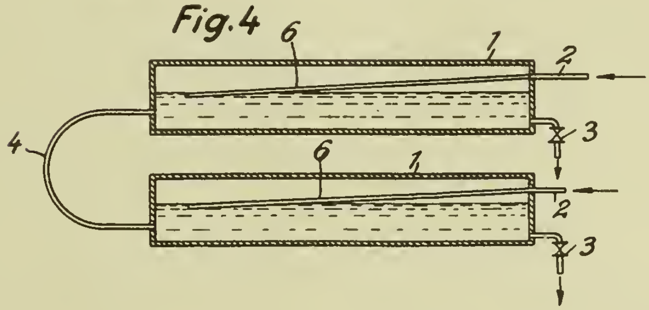


Fig.4



Inventor

By

Attorney

Published May 11, 1943 Serial No. 350,065

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF CADMIUM RED

Johannes Loeffler, Berlin-Dahlem, Germany; vested in the Alien Property Custodian

No Drawing. Application filed August 2, 1940

This invention relates to the production of a red pigment containing cadmium sulfide and selenium which pigments may be used for various purposes, for instance, in the ceramic and glass industry, for glazes, furthermore as filling materials in plastic masses, artificial resins, caoutchouc and the like.

It is known to produce red colored selenium containing pigments in such manner that cadmium sulfide and selenium are heated to high temperatures whereby a conversion to cadmium selenide and free sulphur takes place. Owing to the high reaction temperatures sulphur escapes leaving behind a mixed substantially red colored crystal, formed of CdSe and CdS. This process, however, has various disadvantages. Thus, in consequence to the high temperatures considerable quantities of selenium escape and are therefore lost. Furthermore, undesired coarseness of grain will occur which exerts an unfavourable influence on the quality of the final product. This disadvantage is even enhanced by the fact that the degree of conversion varies in wide ranges according to the degree of heating and the duration of heating. In consequence thereto the reaction products are not uniform. This imperfect uniformity of the final product is very disagreeable, especially with respect to colors and pigments where a distinct shade of color must be reproduceable.

Now it was found that a valuable cadmium red may be obtained in an especially advantageous manner if mixtures containing cadmium sulfide and selenium or substances splitting off selenium are subjected to a heat treatment in the presence of such substances which are able to remove the sulphur set free at the reaction. Such substances are, for instance, oxidation means such as ammonium nitrate or other nitrates and nitrites, or also reduction means such as hydrazin hydrate. The sulphur set free in the reaction is oxidised by these substances, i. e. transformed into SO_2 or reduced, i. e. converted into hydrogen sulfide or volatile sulfides. These last mentioned substances escape from the reaction mixture during the reaction thereby causing a complete removal of the free sulphur. Similar effect will be obtained by the use of phosphorous, arsenic or antimony as additions whereby the sulfides thus formed escape during the reaction.

My invention may be carried out also in such manner that the reaction mixture is heated in the presence of such substances which convert the sulphur into such compounds which first remain in the reaction mixture and may afterwards easily be removed by washing out. Such substances are, for instance, alkali metal nitrates or nitrites, and alkaline substances such as hydroxides or carbonates. These addition means convert the free sulphur into alkali sulfates or sulfites or into polythionates. Further additional substances are light metals, such as magnesium, which are able to bind sulphur without blocking up selenium in a substantial degree. Reduction means may also be used as additions, such as for instance, hydrides or amides of the alkali or earth alkali metals. In this case the sulphur liberated in the reaction is converted into sulfhydrates of sulfides. In the same manner organic compounds may be employed which tend to easily combine with sulphur. These substances are, for instance, olefinic compounds (di-olefines, terpenes and so on) or organic amines such as diphenylamine. The best effects were obtained by using cyanides as sulphur removing additional substances. These substances are converted into thiocyanides which afterwards may very easily be removed by washing with water. The production of cadmium red may be carried out in the presence of cyanides, for instance, potassium cyanide, sodium cyanide, calcium cyanide at very low temperatures which cause the formation of especially valuable pigments. If desired, the selenium may be combined with the cyanides to selenium cyanide and then brought to reaction with cadmium sulfide.

The so formed sulphur compounds are later on removed by washing out with suitable solvents. Sulfates, sulfites or sulfides may, for instance, be washed out with water. Sometimes it has proved expedient to take diluted aqueous acids for this purpose, for instance, phosphoric acid, formic acid, acetic acid. The use of stronger acids or acids with higher concentration is in general not to be recommended as it may lead to a partly decomposition of the cadmium red. Also organic solvents, such as benzene, may be used for the washing out step.

My invention may be carried out very simply in such manner that cadmium sulfide or mixtures containing thereof are heated in a crucible or the like together with selenium or selenium giving substances. Substances which deliver selenium are, for instance, the selenides or polyselenides of the alkali metals or other metals. According to my invention the metallic cation serves in this case as a means for the removal of sulphur and in consequence thereto the formation of the cadmium red is due to a double reaction. A further substance which delivers selenium is selenious

acid. In using this initial material the addition of a reduction means is necessary.

Moreover, the formation of cadmium red according to my invention may also be carried out in the presence of so-called "mineralizers," for instance, sodium chloride. Furthermore, the conversion may also be carried out in the presence of inert filling materials, such as for instance, barium sulfate.

Now I have found that the conversion of the reaction mixture may expediently be carried out at lower temperatures than hitherto known and used. In general, my invention may be carried out at temperatures below about 600° C., preferably between 200 and 500° C. The best results will be obtained in the lower ranges between 200 and 350° C. This is particularly possible through the addition of cyanides, as already mentioned above.

According to my invention it is possible to obtain an extremely divided cadmium red. As these particular fine-grained pigments are especially active in a chemical sense and tend to glow pyrophorously in the presence of the oxygen of the air and at moderate temperatures, I recommend to carry out the reactions and the subsequent cooling in the absence of oxidising gases, preferably in the presence of inert or reducing gases, such as carbondioxide, nitrogen on one hand or hydrogen, carbon monoxide on the other hand. In this manner I may obtain pigments of any desired size of grain after addition of mineralizers or by choosing the most suitable temperature. In all cases, especially in the manufacture of fine-grained cadmium red, pigments of excellent intensity and purity of shades will be obtained. Moreover, according to my invention it is possible to always obtain the same quality and shades of color if the fixed conditions of working are strictly observed. A further advantage lies in the fact that losses of selenium are practically avoided if the operation is carried out according to my invention.

The pigments may be utilized as color pigments for varnishes, mastics, films, further as color pigments for ceramic purposes such as the manufacture of glasses, glazes or the like and finally as coloring filling substances, for instance for plastic masses, artificial resins, caoutchouc or the like.

JOHANNES LÖFFLER.

Published May 11, 1943 Serial No. 351,640

ALIEN PROPERTY CUSTODIAN

HYDRAULIC CEMENT

Walter Dyckerhoff, Mainz-Amoneburg, and Wilhelm Wittekindt, Wiesbaden-Biebrich, Germany; vested in the Alien Property Custodian

No Drawing. Application filed August 6, 1940

This invention relates to a process for producing a high-grade hydraulic cement.

We know already that hydraulic cements which contain alumina and iron in approximately stocchiometric proportions are to be considered as especially high-grade products, because they are distinguished by little liability to shrink, great resistiveness to chemical attacks connected with high strength properties and the production of insignificant heat of hydration in setting. However the manufacture of such cements is in practice subject to considerable difficulties, inasmuch as with a determined content of sesquioxides within narrow limits, the adjustment of the low

$$\frac{Al_2O_3}{Fe_2O_3}$$

modulus required for Ferrari cements is only obtainable with the use of rare materials of specific composition.

Now we have found it advantageous to combine the production of such high-grade cements with an especial process of recovering alumina. Especially adapted for this purpose is the method of solubilizing the raw materials with lime, whereby we are also enabled to utilize materials relatively poor in alumina and rich in silica, viz. in such a manner that the raw materials are heated with lime so as to transform the alumina into calcium aluminates. The calcium aluminates contained in the partly solubilized material are then dissolved in water or aqueous liquids and the alumina is separated from these solutions by well-known means.

On lixiviating the solubilized materials with water a residue is left showing approximately the following composition:

	Per cent
SiO_2	24
Fe_2O_3	7
Al_2O_3	3
CaO	63

This residue is excellently adapted for producing the desired high-grade Ferrari cements so that now, without relying upon especial and possibly rare raw materials the desired low alumina modulus can be adjusted. For instance, by admixing the residue of such lixiviation to a normal raw Portland cement mixture containing about 78% $CaCO_3$, in a combining ratio of 1:1, after calcining the most valuable Ferrari cement containing alumina and iron in nearly stocchiometric proportions is obtained which is especially important for road-building. When proceeding in this manner not only the stores of high-grade limestone are saved, but moreover no pyrite roasting products or other iron ores are needed which otherwise are required for making Ferrai cement.

Example

1000 kilograms of a raw material having the following composition:

	Per cent
Calcining loss	9.5
SiO_2	37.8
Fe_2O_3	16.6
Al_2O_3	30.2
CaO	3.4

were sintered in a rotary furnace at about 1400° C. with 1710 kilograms of limestone containing 97% $CaCO_3$. The finely comminuted calcined product was treated with about 120 cubic meters of water. The residue amounting to 1540 kilograms (calculated as dry material) was mixed with about the same weight of powdered raw Portland cement mixture having the following approximate composition:

	Per cent
Calcining loss	34.6
SiO_2	13.5
Fe_2O_3	1.9
Al_2O_3	3.9
CaO	42.7

After calcining in the well known manner a hydraulic cement having the following properties was obtained:

		Per cent
Analysis:	SiO_2	20.4
	Fe_2O_3	6.3
	Al_2O_3	5.7
	CaO	65.2
	MgO	1.1
	SO_3	0.9
Hydraulic modulus		2.01
Silicate modulus		1.70
Alumina modulus		0.90

Setting period, beginning 3¾ hours ending 5½ hours

Standard strengths (earth-moist material)

	1 day	3 days [1]	7 days [1]	28 days [1]	28 days [2]
Compression	190	428	507	588	673
Tension	23	30	36	40	49

[1] Water storing.
[2] Mixed storing.

Bending-tension and compression strength (plastic)

Bending tension	27	51	67	83	76
Compression	93	256	347	495	512

Shrinkage after 28 days: —0.24.

From the calcium aluminate solution, for instance, a mixture of calcium carbonate and hydrated alumina may be precipitated by carbon dioxide, which mixture may be used as such for making alumina cement, or the calcium carbonate may be separated and from the remaining product pure alumina may be recovered.

WALTER DYCKERHOFF.
WILHELM WITTEKINDT.

Published May 11, 1943

Serial No. 352,080

ALIEN PROPERTY CUSTODIAN

PILLION SADDLE FOR MOTORCYCLES

Rudolf Schleicher, Munich, Germany; vested in the Alien Property Custodian

Application filed August 10, 1940

This invention relates to improvements in pillion saddles equipped with a telescopic spring suspension for motorcycles with rear wheel springing, the guiding of the rear wheel being effected in vertical direction e. g. by a springing of the telescopic type.

Pillion saddles of known construction are e. g. mounted on the luggage grid or on a particular frame extension. This arrangement has the disadvantage that the position of the pillion saddle is relatively high, which because of the resulting high location of the center of gravity means an impairing of the riding characteristics of the motorcycle.

The present invention is avoiding these drawbacks by utilizing a pillion saddle with telescopic spring suspension for motorcycles with rear wheel springing and vertically guided rear wheel. According to the invention the guiding member of the rear wheel springing e. g. the guide tube of a telescopic spring suspension is given an upward extension which is covered by a telescopic springing system for the pillion saddle and abutting against a fixed point of the frame. Thus a very fair-looking, simple construction of the pillion hammock saddle is obtained. Further it is no longer necessary to provide above the mud guard a special frame extension resp. a luggage grid for fixing the saddle thereto, thus securing an as low as possible seating height for the passenger, a favourable location of the center of gravity and improved travelling qualities. By exchanging the saddle cover with a luggage grid, the pillion saddle may be transformed into a sprung rack.

One form of embodiment of the invention is shown by way of example in the accompanying drawing. In this drawing

Fig. 1 is a side view,

Fig. 2 a front view of a motorcycle with a pillion saddle according to the invention.

The rear wheel 7 is guided vertically by means of the telescopic spring suspension 6 and supported by the double frame 3. The pillion saddle 1 is equipped with the telescopic springing system 2 which is covering the extension of the guide tube 8 of the telescopic spring suspension 6 of the rear wheel 7 and abutting against the frame 5. In the present form of carrying out the invention the saddle is provided for the purpose of guiding it with a butt strap 4 which is secured to a fixed point of the frame e. g. the mud guard. If the use of a butt strap is abandoned the spring is preferably secured with both its ends to the frame or the guide tube on the one hand and to the saddle on the other. This may be effected by screwing the spring ends to threaded extensions of the parts in question, the threads being in conformity with the coil of the spring.

RUDOLF SCHLEICHER.

[illegible]

[illegible]

[illegible]

PUBLISHED
MAY 11, 1943.
BY A. P. C.

R. SCHLEICHER
PILLION SADDLE FOR MOTORCYCLES
Filed Aug. 10, 1940

Serial No.
352,080

Fig 1

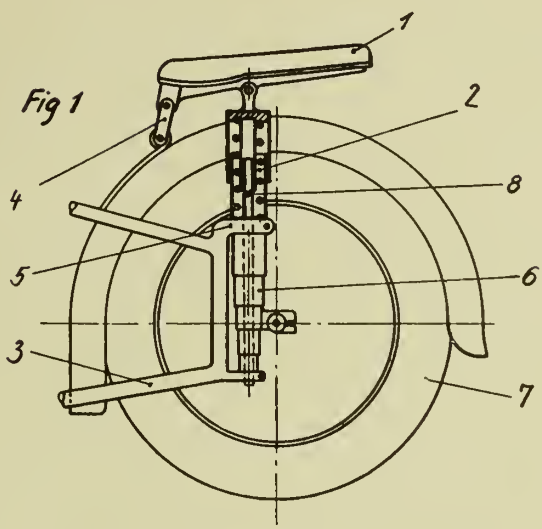
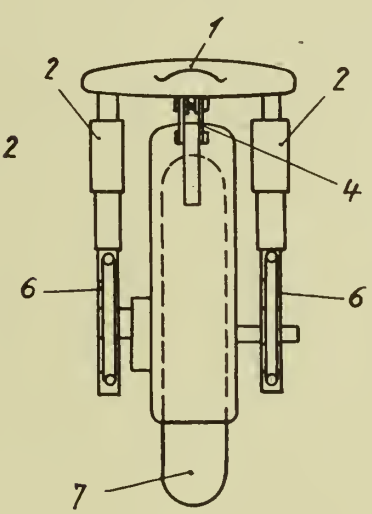


Fig. 2



Inventor
Rudolf Schleicher
By A. A. Wicke
Attorneys

Published May 11, 1943 Serial No. 352,146

ALIEN PROPERTY CUSTODIAN

AXIAL PISTON PUMP

Hans Molly, Berlin-Tempelhof, Germany; vested in the Alien Property Custodian

Application filed August 10, 1940

The invention relates to axial piston pumps with adjustable stroke. A known form of pressure regulation and pressure restriction in such pumps consists in a pump pressure responsive element, for instance a piston automatically adjusting the stroke adjusting member in the sense of a stroke reduction as soon as a certain pressure is being exceeded. In such axial piston pumps two forces balancing one another are as a rule brought to bear upon the stroke adjusting member, namely an external force urging the stroke adjusting member towards its maximal stroke position and a force exerted by the pressure control element tending to return said member to the zero position. Thus a certain pump pressure will always be automatically produced corresponding to the respective amount of the external force. Such devices are used for instance for driving hydraulic machine tools, retracting devices for landing gear or the like, i. e. in all cases where a stop is provided for the part to be moved by the hydraulic motor at the completed motion and where the pressure is prevented from increasing in an undesired manner at continued operation of the pump. Besides these instances calling for pressure restriction there are, however, quite a number of cases in which it may be desirable for the pump to possess a predetermined pressure characteristic.

The invention is based on the perception that it is possible to introduce an essential simplification in the construction of pressure regulating devices in axial piston pumps in which the cylinder block carrier is swingably mounted with a view to stroke adjustment. Instead of as hitherto providing in the pressure conduit of the pump a special element (cylinder with piston) acting on the stroke adjusting member, the requisite regulating forces may according to the invention be produced in the cylinder block carrier itself.

This may be done in such a way that a special pressure cylinder with piston is arranged in the cylinder block carrier, said piston being held in a fixed support. In such an arrangement the pressure responsive regulating element moves with the cylinder block, and special conduits and lever systems may be dispensed with. It is merely necessary to provide the regulating cylinder with a short channel leading to the contacting part of the control surface. This direct connection of the regulating cylinder and the pressure duct of the control surface, beside its obvious advantages, possesses the additional advantage that the pump pressure is produced in the regulating cylinder without retardation and the regulation thus operates free from any pendulous tendency.

A particularly advantageous arrangement consists in the cylinder block carrier being made swingable about an eccentric axis in such manner that the pressure produced in the pump cylinders acts upon the cylinder block carrier in the sense of a stroke reduction. In such cases the pressure in the working cylinder itself is thus used for regulation with the result that special regulation devices are not required. Hence the pressure regulation is achieved without any special constructional elements being necessary.

The invention is defined in greater detail in the following with reference to certain embodiments.

Fig. 1 of the drawings shows the embodiment of an axial piston pump in which the regulating force is produced by a special cylinder with piston, and

Fig. 2 another such pump in which the regulating force is obtained by means of the cylinder block carrier being swingable about an eccentric axis;

In Fig. 2*a* this eccentric support is additionally illustrated;

Fig. 3 is distinct from Fig. 2 in that the cylinder block is differently connected to the driving flange. In all figures the same reference characters designate identical parts.

In Fig. 1 the character **1** denotes the axis of the driving flange **2** which is supported in the housing **3** in ball bearings **4** and **5**. Piston rods **6** are articulately connected with the driving flange **2**, said piston rods **6** imparting to pistons **8** slidably arranged in a cylinder block **7** a reciprocating motion provided the axis of the cylinder block **7** is deflected relative to that of the driving flange **2**. In the embodiment shown the pistons **6** via the pistons **8** serve to impart a follow-up movement to the cylinder block **7** which is not however an essential feature of the invention. The cylinder block **7** is rotably supported in a cylinder block carrier **9**, the latter being swingable about an axis **10**. The plane control surface **11** of the cylinder block **7** is connected on the one hand to the flexible pipe conduit **12** via respective control orifices, said conduit **12** leading to a consumption apparatus (not shown)—as for instance a pressure fluid motor—and is on the other hand connected via a channel **23** with a cylinder **13** arranged in the cylinder block carrier **9**. In this cylinder **13** slides a piston **14** which is in turn supported against

a fixed support 15. Thus a force acts upon the cylinder block carrier 9 which in dependence on the pump pressure produced acts on said carrier in the sense of a stroke execution. The external stroke increasing force is produced by a spring 16 acting upon the cylinder block carrier 9 at the point 17 and at a fixed point 18.

The arrangement operates as follows: The pressure occurring in the conduit 12 at a certain pressure medium consumption via the piston 14 sliding in the cylinder 13 produces a force which tends to deflect the cylinder block carrier into its zero position, as of course this piston is supported against a fixed point. This force is counteracted by an external force produced by the spring 16 tending to deflect the cylinder block carrier 9 towards its maximum stroke position. The two forces balance one another so that a pressure may occur in the conduit 12 in dependence on the spring tension. The special piston 14 of Fig. 1 may be dispensed with if—as shown in Fig. 2—the cylinder block carrier 9 is not arranged centrically about an axis 10 but is swingable about an eccentric axis 19. In the latter case the pressure produced in the pump cylinder acts on the cylinder block carrier 9 in the sense of a stroke reduction. This embodiment further differs from that of Fig. 1 in that the control surface is not plane but—as previously proposed elsewhere—has the form of a sphere 20, in which case the support axially guiding the cylinder block is dispensed with. Naturally, however, it is equally possible to provide for a plane control surface. In any case it is, nevertheless, necessary that the cylinder block carrier 9 be articulately connected with the driving flange 2 via a special centering member 21 in a ball on said driving flange. In this way the support of the cylinder block is free from overdetermination. This kind of support allows the compensation for displacements due to kinematic conditions.

In the case now under consideration, in which the cylinder block carrier 9 is swinable around an eccentric axis 19, this kind of support is particularly important in so far as the position of the point of intersection of the cylinder block axis and the driving flange axis is always precisely determined by the centric guiding member 21, and the slight motions caused by the eccentric position of the cylinder block carrier 9 relative to the cylinder block 7 due to the stroke adjustment are received by the control surface without disturbing effects.

The centering member 21 is acted upon by the tension of a spring 22 ensuring constant contacting of the cylinder block 7 with the control surface 20. In this connection it is advantageous to have the spring 22 simultaneously act on a check valve 24 connected with the high pressure side of a pump via a duct 25 and exert a dampening effect on the reversing motion of the cylinder block 7.

As shown in Fig. 2*a*, the eccentric pivot point 19 of the cylinder block carrier 9 lies in the normal N to the bisectrix W of the largest angle α possible between the axis of rotation U and the cylinder block carrier axis V, because this normal N is the geometrical point for all circle centers touching the axis of rotation U and the cylinder block carrier axis V and because in this position the smallest possible deviation of the axial intersection point from the desired intersection point is afforded with the result that the above described sliding motion of the cylinder block 9 on the control surface 20 at stroke adjustments is reduced to the smallest possible amounts.

The embodiment according to Fig. 3 similar to that shown in Fig. 2 possesses an excentric support 19 of the cylinder block carrier 9 and a plane control surface 11. In distinction from the embodiments before mentioned the cylinder block 7 does not however follow the movement of the piston rods 6 via the pistons 8, a double cardan joint 25, 26 being provided for causing the follow-up movement via a member 28, which is non-rotatably mounted in the cylinder block by means of a piston 29. A double cardan joint is required because, as mentioned above, the cylinder block 7 at a stroke adjustment undergoes slight displacements due to the eccentric support at 19. As in contrast to Fig. 2 the cylinder block is not supported between two spherical surfaces, it is necessary to guide the plane control surface by means of a special centering member 27.

The invention is not restricted to the embodiments described, there being further possibilities of construction by suitable combination of the details described above with other known features.

HANS MOLLY.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. MOLLY

AXIAL PISTON PUMP

Filed Aug. 10, 1940

Serial No.

352,146

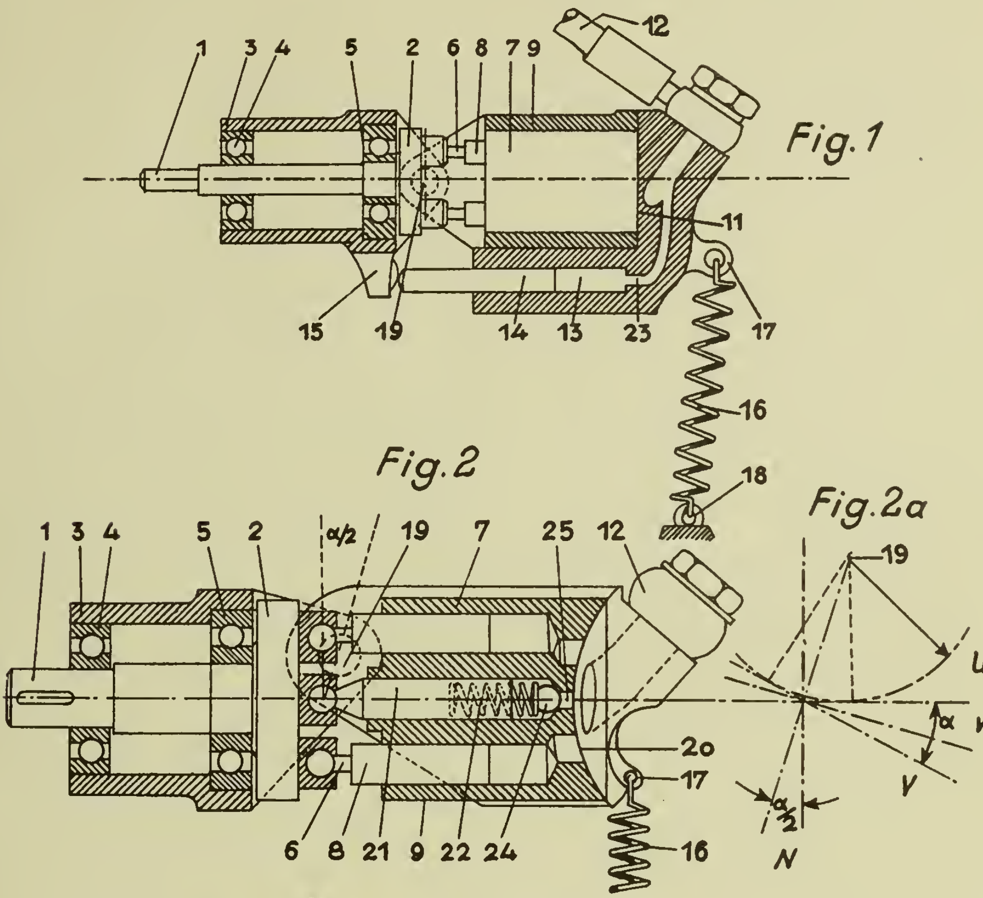


Fig. 1

Fig. 2

Fig. 2a

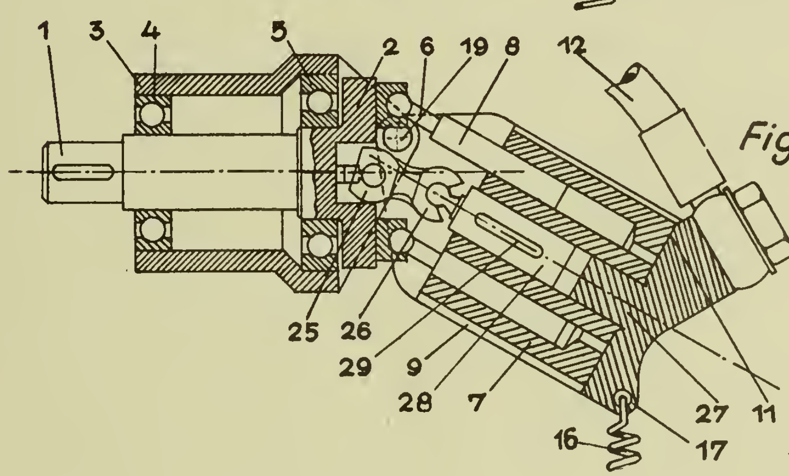


Fig. 3

Inventor

Hans Molly

By A. D. Adams

Attorney

Published May 11, 1943

Serial No. 352,147

ALIEN PROPERTY CUSTODIAN

PUMP, MORE PARTICULARLY AN AXIAL PISTON PUMP WITH ADJUSTABLE STROKE

Hans Molly, Berlin-Tempelhof, Germany; vested in the Alien Property Custodian

Application filed August 10, 1940

The invention relates to pumps with adjustable stroke in which according to a known arrangement a stroke adjusting pressure control device is provided acting on the stroke adjusting member in opposition to a spring determining the desired pressure. As is known, pumps of this kind operate in such manner that a spring acts on the stroke adjusting member so as to urge it toward its maximal stroke position. This spring is counteracted by a pressure responsive regulating member tending to return the stroke adjusting member to its zero position. Thus, the spring force and the adjusting force balance one another at a certain pressure determined by the spring force. If the pressure decreases on account of increased pressure fluid consumption, the spring force will preponderate and shift the stroke adjusting member until the pump due to the increased pressure fluid amount is again capable of maintaining a pressure equalling the force of the spring. The object of the present invention consists in obtaining a desired characteristic of the predetermined pressure course in dependence on the adjustment of the stroke adjusting member. It may for instance be desirable for certain purposes to maintain constant the predetermined pressure independent of the position of the stroke adjusting member. As however the tension of the spring decreases at increasing spring displacement and increasing displacement of the stroke adjusting member, respectively, this object may not be attained simply by means of a spring per se. The inventive principle consists in the feature that the points of suspension of the spring are so chosen as to vary the effective lever arm of the spring in response to the varying displacement of the stroke adjusting member in such manner that the predetermined pressure course may be chosen according to a curve which is independent of the spring characteristic. If the suspension points of the spring are for instance chosen in such manner that the effective lever arm of the spring increases in proportion to the increasing displacement of the stroke adjusting member and the increasing displacement of the spring, respectively, a constant rocking moment is obtained at all deflection angles of the stroke adjusting member and hence regulation onto a constant pressure value may be effected. The points of application of the spring force may, however, also be chosen in such a way that the effective lever arm of the spring decreases at increasing deflecting angles. In such an arrangement the pump is rendered capable of automatically maintaining a high pressure even at small pressure fluid amounts and a lesser pressure decreasing according to a predetermined characteristic at small pressure fluid amounts. Such a characteristic is for instance desirable in cases where a pressure fluid motor is fed from the pump, said motor being required to produce great force at a small number of revolutions and a lesser force at a great number of revolutions.

An essentially different characteristic of the pressure development is obtained if in further modification of the embodiment of the invention the points of application of the spring force are so chosen that the effective lever arm of the spring, and hence the rocking moment, increases in proportion to the deflecting angle of the stroke adjusting member. In such cases the pump normally operates with maximum stroke volumes. As soon, however, as the pressure in the pressure conduit exceeds the maximum rocking moment, the stroke adjusting member due to this preponderant pressure suddenly returns to the zero position and the pump maintains at a minimal pressure fluid amount a lesser pressure corresponding to the reduced rocking moment. Now as soon as this pressure drops still further the rocking moment will preponderate, immediately returning the stroke adjusting member to its maximal stroke position until the process described repeats itself. Such a pump characteristic is for instance required for retracting gear for undercarriages, in which the undercarriage in the first instance has to be retracted at a high pressure and subsequently after adjustment has to be maintained in the retracted position at lesser pressure. In all arrangements, in which the effective lever arm of the spring increases with increasing deflection angles, it is advantageous with respect to space to produce the rocking moment by means of a compression spring.

In the following the invention is explained in detail with reference to the embodiments shown in the drawings, in which

Fig. 1 shows an embodiment of a spring suspension in which a constant rocking moment is attainable at all deflection angles of the stroke adjusting member,

Fig. 1*a* shows the same arrangement in the zero position at a deflected position of the stroke adjusting member, and

Fig. 2 discloses a mode of spring suspension in which the effective lever arm of the spring is reduced at increasing deflection angles of the stroke adjusting member.

Fig. 3 shows an embodiment, in which the ef-

fective lever arm of the spring increases as the deflection angle increases.

Fig. 4 illustrates an embodiment in which the tension spring of the embodiment in Fig. 3 is replaced by a correspondingly connected compression spring. In all figures the reference characters stand for identical parts.

In the Figs. 1 and 1*a* the numeral **1** denotes a driving shaft of a driving flange **2** supported in a casing **3** by means of ball bearings **4** and **5**. Piston rods **6** are articulately connected to the driving flange **2**; the respective piston, provided that the axis of the driving flange **2** inclines relative to the cylinder block **8**, reciprocate in said cylinder block **8** which is arranged in a carrier **7**. The follow-up movement of the cylinder block **8** is advantageously effected in a manner already known, namely by means of piston rods **6** articulately connected to the driving flange **2**. Through the piston stroke a certain amount of pressure fluid is pumped from a pressure fluid container (not shown) into a conduit **10** via a bore **9** in a control surface of the cylinder block **8**. the amount being dependent of the angle of deflection of the cylinder block carrier relative to the driving flange, and said conduit leading to a consumption apparatus, for instance a pressure fluid motor (not shown). The pressure in the conduit **10** further acts via a conduit **11** on a piston **12** arranged in a cylinder **13**. The free end **14** of the piston **12** is developed as a piston rod and articulately connected at **15** to the carrier **7** of the cylinder block **8**. A spring **16** is secured at the same point, the other end being fixed on the casing **3** at the point **17**. The tension of the spring **16** tends to deflect the cylinder block **8** together with its carrier **7** about the pivot point **18** and is counteracted by a counterpressure acting on the piston **12**.

Be it assumed that the cylinder block carrier **7** is deflected by a certain angle for producing a certain predetermined pressure as shown in Fig. 1*a*. This position of the cylinder block carrier corresponds to a certain pressure value in the conduit **10** as well as to a certain rocking moment exerted by the piston **12** via the conduit **11** on the cylinder block carrier **7** and a certain countermoment produced by a spring **16**, the force of which is applied below the lever arm h'. In the position shown these two moments balance one another i. e. the consumption apparatus is regulated onto a certain predetermined pressure. If the pressure increases in the conduit **10**, the piston **12** tends to reestablish the predetermined in the conduit **10** by adjusting the cylinder block carrier **7** at a reduced angle corresponding to the increased fluid pressure. To this position corresponds a reduced lever arm h' of the spring but an increased spring tension, and therefore the rocking moment of the spring remains constant so that the stroke adjusting member upon the reattainment of the predetermined pressure resumes the illustrated position. Contrary to this the cylinder block carrier at diminishing pressure in the conduit **10**, in order to restore the predetermined pressure, tends to assume a more deflected position. In this instance also the rocking moment of the spring **16** remains constant as the lever arm h' increases in length while the spring force decreases. Thus in every position of the cylinder block carrier the spring **16** exerts a constant rocking moment thereon requisite for regulating onto a constant pressure.

Fig. 2 shows a mode of spring suspension according to which the rocking moment exerted by the spring increases as the angle of deflection decreases. In the initial position of zero the lever arm h is operative. In the deflected position (dotted spring) the reduced lever arm h' is operative. This is due to the fact that the spring is not—as shown in Figs. 1 and 1*a*—articulately secured on the casing **3** but at a point **19** outside the casing. A characteristic obtained in this way is desirable, as already mentioned at the beginning, where a pressure fluid motor has to be fed, said motor having to exert great force at a small number of revolutions and inconsiderable force at a large number of revolutions. The pump illustrated is further distinct from those shown in Figs. 1 and 1*a* in that the moment counteracting the spring **16** is not produced by a special piston but by means of the pivot point **18'** of the stroke adjusting member being eccentric relative to the axes of the driving flange and of the cylinder block. Furthermore the control surface **20** contrary to that of the above mentioned embodiment is of spherical form while the cylinder block **8** is articulately connected with the driving flange **2** by means of a special centering member **21** supported by means of a spring **22**.

An embodiment in which the effective lever arm of the spring and consequently the rocking moment thereof increases at increasing angles of deflection is shown in Fig. 3. Here also the force tending to shift the stroke adjusting member into its zero position is produced by supporting the cylinder block **7** eccentrically at **18'**. The spring force **16** is on the one hand applied to the cylinder block carrier **7** at **15** and on the other hand on the casing **3** at **23**.

As mentioned above in describing the mode of operation of this kind of pumps, this pump is operative in but two positions, namely at the maximal stroke and at a small set predetermined stroke, while it is inoperative in any other position.

The effect obtained according to Fig. 3 by means of a tension spring **16** may be obtained, as shown in Fig. 4, by using a compression spring **24**, said compression spring acting on the one hand on the stroke adjusting member at point **15** and on the other hand resting against a fixed point **25**. The operation of such a compression spring will be apparent from above description. The use of such a compression spring offers advantages in so far as it can be easily mounted in the pump casing. As moreover the compression spring can act centrically on the cylinder block carrier, one drawback connected with the use of tension springs is eliminated, namely that two springs must be provided in order to avoid one-sided application, said springs having to be arranged alongside the cylinder block (cfr. Fig. 3).

As already mentioned, the figures merely represent embodiments of the invention. It is of course possible to use the spherical control surface according to Figs. 2–4 in the embodiments according to Figs. 1 and 1*a*. Furthermore the countermoment according to Figs. 1 and 1*a* produced by a special piston may be obtained by excentric support of the stroke adjusting member as shown in Figs. 2–4.

HANS MOLLY.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. MOLLY

PUMP, MORE PARTICULARLY AN AXIAL PISTON PUMP WITH ADJUSTABLE STROKE

Filed Aug. 10, 1940

Serial No. 352,147

2 Sheets-Sheet 1

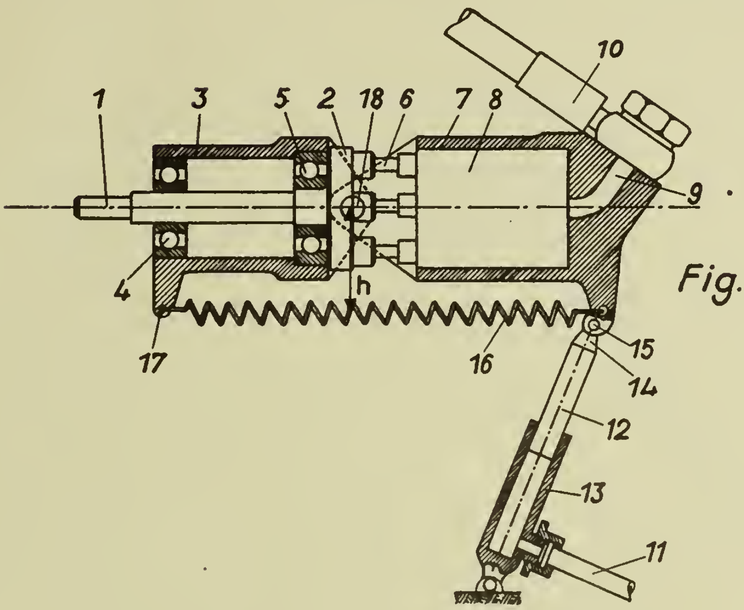


Fig. 1

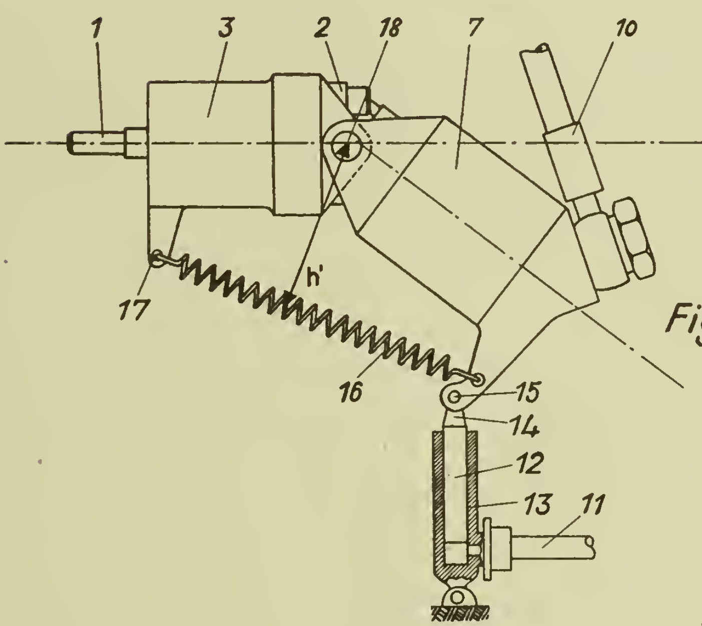


Fig. 1a

Inventor
Hans Molly

By A. D. Adams

Attorney

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. MOLLY

PUMP, MORE PARTICULARLY AN AXIAL PISTON PUMP WITH ADJUSTABLE STROKE

Filed Aug. 10, 1940

Serial No. 352,147

2 Sheets-Sheet 2

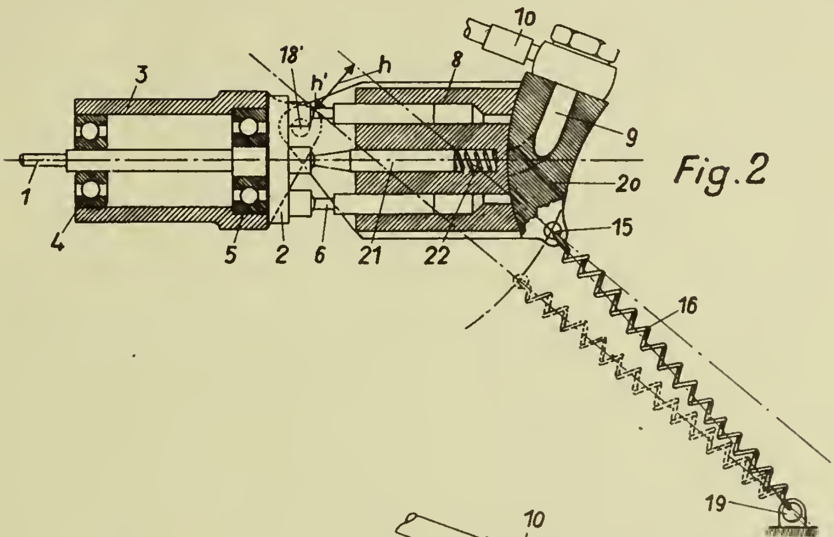


Fig. 2

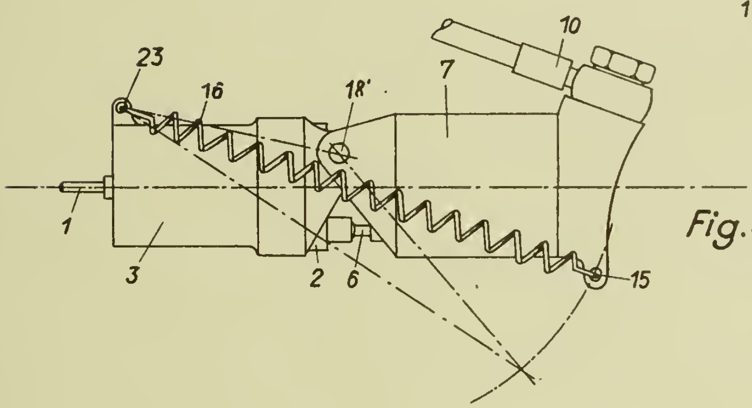


Fig. 3

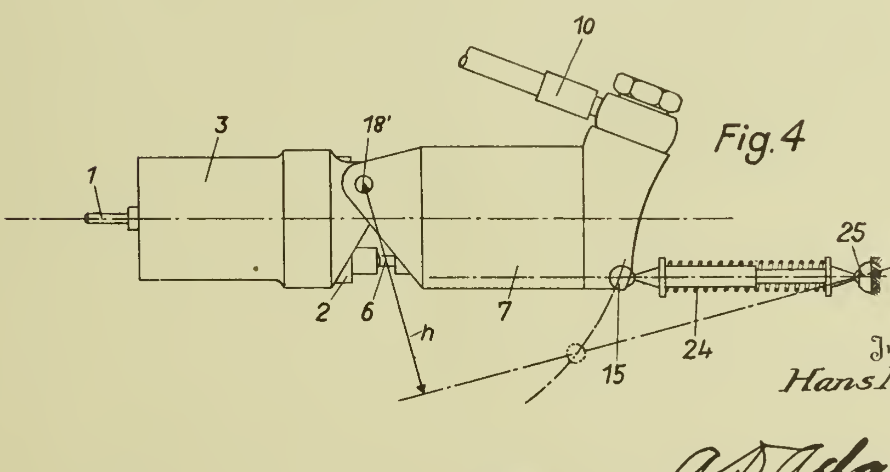


Fig. 4

Inventor
Hans Molly

By A D Adams

Attorney

Published May 11, 1943 Serial No. 352,309

ALIEN PROPERTY CUSTODIAN

ARSENICAL INSECTICIDAL COMPOSITION

Carlo Paoloni, Pieve Vergonte, Italy; vested in the Alien Property Custodian

No Drawing. Application filed August 12, 1940

The use of arseniates in general for the extermination of plant injuring insects in liquid as well as in powder form is already known. The lead arseniate has been found the best of all the arseniates heretofore known as it is very active on all parasitic insects and is innocuous to the plants.

The lead arseniate is, however, generally used in the liquid state that is to say in suspension in water in a concentration of 0.3—0.5%. Experiments have been carried on for using the lead arseniate in the powder state in view of avoiding transportation of water; these experiments however failed to succeed as the lead arseniate owing to its particular nature and its poor flowing properties is not suitable for spraying while when mixed with other inert diluting substances separates and cannot be properly applied. The lead arseniate has not therefore been used in the powder state for agricultural purposes and calcium arseniate has been preferred, which is a flowing powder and can therefore be easily sprayed. Calcium arseniate, however, is far less active than the lead arseniate and cannot be dusted on all plants, as it generally scorches the leaves.

This invention has for its object a process for applying the lead arseniate in the powder state to plants, which complies with all agricultural requirements. It has been found that when the powder of lead arseniate is mixed in a small quantity of water with clays of colloidal nature and having capillary properties very hard agglomerates are obtained when dried, which, when ground, produce flowing and adhesive powders, the particles of which are of equal composition and can be sprayed without risk of separation of the components. As colloidal clays having capillary properties it has been found suitable to use natural or chemically activated fullers earth.

The composition prepared according to this invention has insecticidal properties owing to its lead content acting through ingestion and, moreover, in view of the capillary properties of the agglomerate possesses a remarkable superficial activity, so that it may be largely used as contact insecticide when dusted on the insects. This combined capillary and poisonous action makes the composition suitable for exterminating chewing as well as sucking insects.

The new arsenical composition according to this invention can therefore be used in powder state sprayed on cultivated plants, mixed with seeds, disseminated in the soil, or in the preparation of baits.

The composition according to this application can be diluted, before or after having been agglomerated with other inert insecticidal, fungicidal, attractive, repellent or similar substances.

Example.—70 parts by weight of chemically activated fullers earth and 30 parts by weight of biplumbic arseniate containing 21% of arsenic are introduced into a mixer. The mixture is admixed with water and stirred until a thick homogeneous paste is obtained. The paste is ready for use after 3 hours treatment and is spread on sheets and heated to the temperature of 120–125° C until it is fully dried and hardened. A dry and very hard agglomerate is obtained which is then ground in a ball mill to pass through a sieve of 7000 mesh to the cm^2. A very fine composition apparently of high density the particles of which however are movable on one another is obtained, which contains about 6,5% of arsenic. This composition is very effective for exterminating chewing and sucking insects attacking olive and vine trees, beets, etc.

CARLO PAOLONI.

[illegible]

[illegible]

Published May 18, 1943

Serial No. 352,416

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE ELECTROLYTIC PRODUCTION OF OPAQUE LAYERS, SIMILAR TO ENAMEL, ON ALUMINIUM AND ITS ALLOYS

Carlo Sonnino and Antonio Sassetti, Milan, Italy; vested in the Alien Property Custodian

No Drawing. Application filed August 13, 1940

The invention relates to a process for the electrolytic production of opaque layers, similar to enamel, on aluminium and its alloys, wherein a continuous and alternating current is used.

Many processes for producing protection layers on aluminium and its alloys are already known, which are based on baths of anodic oxidation, containing salts of various metals, as for inst. titanium. But it should be remarked, to this purpose, that the titanium salts, as titanium oxalate, titanium phosphate, etc., on the tempertaure and electrochemical operation conditions, in an oxidation bath, and patricularly in the anodic oxidation zones, are extremely unstable, and the bath can only operate on normal conditions, for a short time.

It is known from other part, that the bleaching and the opacity of the layer are due to the titanium oxhydrates deposit, which are to be transformed into anhydres, also by means of thermical treatments. This confirms the probability of a progressive depletion of the bath and hence the necessity of rigorous and continuous controls, in order to obtain a production uniformity.

According to the invention, these inconvenients are avoided and it is allowed to form protection oxide layers, having a white-opaque colour on aluminium and its alloys, by using the formation of such crystalline types of aluminium oxide, as to make entirely opaque its surface.

These layers may also be apt to take different colourings when immerged in colour baths, or when a reaction of the same with special chemical agents takes place.

The invention is substantially characterised by the fact that the bath is fundamentally constituted by aqueous solutions of magnesium or zinc chromates, separately or joined with other soluble and stable salts of aforesaid metals, containing chromic acid in such sufficient quantity as to entirely keep into solution said salts.

It was already noted, on special conditions, that the aqueous solution of chromic acid, without other addition, succeeds in giving a layer of half-opaque white oxide on aluminium articles being connected with the positive pole of a source of continuous current and immersed in the aforesaid bath. The magnesium and zinc salts allow the bath to always produce such a layer of white-opaque oxide as to bring off from the surface any metallic appearance.

The layers being formed on the hereinafter mentioned conditions, is very fire proof and does not crack as the oxide layers bging formed by the ordinary processes, when the same are submitted to a high tempertaure. Moreover, this layer is hard, very much corrosion—abrasion—and wearproof.

The bath, according to the characteristics required for the layer, may have compositions comprised within the following limits:

Zinc chromate or other simple or compound zinc salts: from 0,5% to 20%;
Chromic acid: from 5% till saturation in distilled water, or

Magnesium chromate, or other simple or compound magnesium salts: from 0,5% to 20%;
Chromic acid: from 5% till saturation in distilled water, or

Zinc chromate or other simple or compound zinc salts: from 0,5% to 20%;
Magnesium chromate or other simple or compound magnesium salts: from 0,5 to 20%;
Chromic acid: from 5% till saturation in distilled water.

These zinc or manesium salts may be added together or separately, and, for certain purposes, the solution of chromic acid in water will be used with the addition of smallest quantity (5%) of magnesium as well as of zinc salts. The same are intended to operate on the following conditions of tension, current density and temperature:

Alternating and continuous current at the tension from 10 to 25 Volts;
Current density: from 1,8 to 2,5 Ampère p. square decimetre
Temperature: from 20° to 80° C.

The invention comprises of course also the layers obtained by the before described process and the articles provided with such layers; and it is understood that the particulars for actuating the invention may vary, without departing from its limits.

CARLO SONNINO.
ANTONIO SASSETTI.

Published May 11, 1943

Serial No. 352,814

ALIEN PROPERTY CUSTODIAN

WOOD PRESERVATIVE AND PROCESS OF PREPARING THE SAME

Hilarion G. Henares, Manila, P. I.; vested in the Alien Property Custodian

No Drawing. Application filed August 15, 1940

The present invention relates to a preservative for wood or the like, and the process of preparing the same, and more particularly to a wood preservative comprising the distillation products resulting from the destructive distillation of cocoanut (cocos nucifera) shells.

An object of this invention is to provide a wood preservative which is also an insect repellant, possessing the property of repelling termites or the like.

Another object is to provide a wood preservative which when applied to wood easily dries and does not leach out upon exposure to rain or sun.

Other and further objects and advantages of this invention will be apparent from the following description thereof and from the claims appended thereto.

The preservative constituting the present invention comprises the combined distillate derived from the destructive distillation of cocoanut shells, and comprising primarily pyroligneous acids and tar, which subjected to fractional distillation yield methyl alcohol, acetic acid, light and heavy oils, carbolic compounds and creosote.

The distillation is carried on in a retort or other suitable distilling apparatus. The cocoanut shells, preferably dry, are placed in the said retort and the temperature thereof gradually raised by external firing until the gas inside the retort reads between 300° C to 550° C. This temperature is maintained for a period from eight to twelve hours.

It is to be understood that the temperature range and time of heating referred to above is not critical, so long as the temperature range used and the time period for heating are sufficient to bring about the destructive distillation of the cocoanut shells to obtain the desired distillate.

The hot gases are led from the retort or carbonizing chamber through a suitable condenser and gas separator to catch all the distillate. The noncondensable gases are preferably led into the furnace of the retort after leaving the condenser.

A typical run on the destructive distillation of cocoanut shells gives after an overall analysis the following approximate percentage composition:

	Per cent
Water, acetic acid, methyl alcohol and light oils	74.15
Creosote and carbolic portions	8.29
Residue	6.29
Gases and losses	11.27
	100.00

In the above example, the acetic acid, methyl alcohol, oils, creosote and carbolic compounds comprise the principal ingredients of the destructive distillation product of cccoanut shells which is both a wood preservative and an insect repellant. A typical distillate comprises approximately 90% acetic acid, methyl alcohol, and oils and approximately 10% of creosote and carbolic compounds.

In treating the wood with the distillate, the product to be known as Nadeco wood preservative, conventional methods of application may be employed. The wood preservative may be applied to the wood with a brush, or if deeper penetration of the product is desired, the wood can be heated and the preservative applied under pressure.

The preservative is particularly important because it dries easily after application to the wood, withstands exposure to sun and rain without losing its wood preserving and insect repelling characteristics, and increases resistance of the wood to the rotting effect of water.

HILARION G. HENARES.

Published May 11, 1943 Serial No. 353,386

ALIEN PROPERTY CUSTODIAN

CELLULOSE SOLUTIONS AND A PROCESS OF PREPARING SUCH SOLUTIONS

Otto Hecht, Ludwigshafen-on-Rhine, and Ernst Gassenmeier, Mannheim, Germany; vested in the Alien Property Custodian

No Drawing. Application filed August 20, 1940

The present invention relates to cellulose solutions and a process of preparing such solutions.

It has been known that cellulose may be dissolved in aqueous solutions of quaternary ammonium hydroxides, for example in aqueous solutions of quaternary benzylammoniumhydroxides.

We have now found that solutions of quaternary pyrrolidinium hydroxides are especially suitable for dissolving cellulose. The solutions obtained are clear and filterable and may be stored for a long period of time.

Quaternary pyrrolidinium hydroxides are easily obtained by treating N-substituted pyrrolidines with mineral acid esters of aliphatic, cycloaliphatic or araliphatic alcohols, e. g. alkyl or aralkyl halides, dialkyl sulfates or para-toluene sulfonic acid alkyl esters, and saponifying the quaternary salts obtained with water in the presence of metal oxides or hydroxides, such as barium hydroxide or silver oxide.

Generally speaking, the range of concentration within which the pyrrolidinium hydroxides are effective solvents for cellulose is from about normal to 4 normal. The pyrrolidinium hydroxide may be dissolved in water or in liquid alcohols or in mixtures of water with alcohols. These solutions are capable of dissolving cellulose at normal temperature or at lower temperatures, such as from −10 to 10° C. Higher temperatures may also be used. In order to inincrease the solubility of cellulose in these solutions, superatmospheric pressure may be employed, for example by applying an inert gas, such as nitrogen, under high pressure. Dissolution may also be facilitated by using mechanical means, such as shaking or stirring devices.

The cellulose to be dissolved may be of natural origin or regenerated. There may be used cotton linters, bleached sulfite or sulfate cellulose, mechanical wood pulp, regenerated cellulose such as viscose or cuprammonium artificial fibres or other hydrated cellulose.

The cellulose solutions prepared may be used for the manufacture of fibres or foils by passing the solutions through suitable orifices into acid solutions. Cellulose sheets may also be prepared from such solutions by flowing them in a uniform layer on a plate and allowing the solvent to evaporate.

The following examples will further serve to illustrate the practice of our invention. The invention, however, is not restricted to these examples. The parts are by weight.

Example 1

5 parts of cotton linters are added to 100 parts of a 3 normal aqueous solution of N.N-diethylpyrrolidinium hydroxide. The mixture is allowed to stand at 0° C., while shaking it from time to time, until there is obtained a clear, pale yellow solution. Further 1.5 parts of cotton linters may be dissolved when applying the solution to linters under a nitrogen pressure of 100 atmospheres.

Instead of N.N-diethylpyrrolidinium hydroxide there may be used analogous compounds wherein one or two ethyl groups are replaced by other alkyl groups such as methyl, amyl, hexyl etc. or by the benzyl group.

Example 2

6 parts of cotton linters are treated in the manner described with 100 parts of a 3 normal solution of N-propyl-N-ethylpyrrolidinium hydroxide. A clear solution is thus obtained. When working under a pressure of 100 atmospheres, 7 parts of linters may be dissolved.

Under otherwise identical conditions 8 parts of cotton linters may be dissolved in 100 parts of a 3 normal aqueous solution of N-butyl-N-ethylpyrrolidinium hydroxide under normal pressure, whereas 10 parts of linters are dissolved under 100 atmospheres pressure.

OTTO HECHT.
ERNST GASSENMEIER.

Published May 11, 1943

Serial No. 353,906

ALIEN PROPERTY CUSTODIAN

BONDED REFRACTORIES AND METHOD OF MAKING SAME

Victor Moritz Goldschmidt, Smestad, Norway; vested in the Alien Property Custodian

No Drawing. Application filed August 23, 1940

This invention relates to bonded refractories containing substantial amounts of magnesium orthosilicate. It is known to manufacture refractory building materials which contain substantial amounts of magnesium orthosilicate Mg_2SiO_4 or in which magnesium orthosilicate is the main constituent. For instance such refractory materials have been made from natural olivine rocks, such as dunite. Although such refractory materials have been found very useful for many purposes, there are certain difficulties connected with the use of magnesium orthosilicate refractory material. These difficulties consist mainly in a disintegration or peeling off of the refractory bricks or shapes after prolonged service at very high temperatures, especially in the roofs of open hearth furnaces. According to extensive investigations made by me, this special type of disintegration is found to be due to a recrystallisation of the magnesium orthosilicate near the heated surface of the refractory, the recrystallized portions being separated by cracks and fissures from the remainder of the refractory bodies. A very large tonnage of refractory bricks is consumed annually for building of roofs of open hearth furnaces and for more than ten years it has been considered of much importance to make improved refractories for that purpose, instead of the silica brick now mostly in use. Also for other purposes, such as for instance electric arc furnaces it is very desirable to make improved refractories, for instance as a substituted for chrome-magnesite brick.

While until now commercial refractory products containing natural substances rich in magnesium orthosilicate such as olivine rock as a substantial or main constituent have been made from comminuted raw materials in such a manner that the fired products have a porosity of about 25 to 30 percent by volume, or even more, the present invention is based upon the discovery that the disadvantage of peeling off can be substantially reduced or avoided if a highly refractory product is made which is less porous than the magnesium orthosilicate refractories which have been used commercially hitherto.

Ossasionally relatively dense products containing magnesium orthosilicate have been made on an experimental scale. Such products, having apparent porosities, for instance between about 18 and 24 per cent by volume have been described; however, such products have been made with incorporation of excessive amounts of substances acting as fluxes, such as sodium silicate in excess of 2 per cent by weight, or highly aluminous cement in excess of 5 per cent by weight, thereby deteriorating the refractory properties to such a degree that commercial use for usch purposes as for basic open hearth furnaces roofs has been impossible. Dense magnesium orthosilicate has been made on an experimental scale from hydrous silicates by heating them to a temperature of excessive shrinkage, thereby destroying the shape of the products, thereby rendering the process useless for the production of bonded refractories.

Satisfactory products according to the present invention are being obtained if porosity is reduced to not more than 22 per cent by volume, as measured in the usual manner by means of immersing the shaped product in a liquid and afterwards measuring the amount of liquid absorbed. Thus the "apparent porosity" is found which for practical purposes gives a satisfactory measure.

Very much better results are being achieved with products the apparent porosity of which does not exceed 20 per cent by volume. It has been found that highly refractory forsterite products can be regularly manufactured according to methods described in the following, and such products having a volume porosity of less than 20 per cent, for instance about 18 or 19 per cent, give excellent results in practice. It has been found possible to manufacture such products which have a volume porosity less than 15 per cent and even down to about 10 per cent. For most purposes, however, such products having an apparent volume porosity of between 15 and 20 per cent have been found to be preferable.

According to the present invention, refractory materials containing substantial amounts, for instance more than 50 per cent by weight, of magnesium orthosilicate can be made which are considerably more resistive against destruction during prolonged service at extremely high temperatures, than previous refractories of the same or similar chemical composition, and also other important properties, such as the cold crushing strength and resistivity against thermal shock, are materially improved by the same method.

For other non-plastic refractories, such as chromite or magnesite, the manufacture of dense products has been satisfactorily made by means of a combination of grading the grains sizes and moulding under high hydraulic pressures, such as 600 or 1000 kg. per sq. cm. For refractories containing substantial amounts of granular comminuted dunite rock such a procedure cannot be recommended, because the hard grains are so

brittle that they are crushed under high pressures, thereby impairing the strength of the products.

Therefore, one cannot adopt methods as used for other non-plastic refractories, but it has been found possible to make satisfactory dense bricks having magnesium orthosilicate as the main constituent, by methods of combined densifying effect of several measures such as elimination of certain objectionable constituents, reduction of moisture and shrinkage of shaped products by means of firing.

As the refractories concerned are intended for service at very high temperatures such as in roofs of open hearth furnaces, they must conform to a high standard or refractoriness, corresponding to a temperature of failure under load of not less than 1500°C., the load being 25 lbs. per square inch, according to the procedure of the American Society for Testing Materials. Only a slight compression under load at 1500° C. may be permitted. It therefore is important to exclude from the method of manufacture any steps impairing the refractoriness, even if such steps might be apt to decrease porosity. I have found that incorporation of such bonding substances as alkaline compounds, such as sodium silicate, and compounds of alumina, such as clay, kaolinite, bauxite, aluminous cement, have a special fluxing effect upon substances rich in magnesium orthosilicate, and in the manufacture of products according to the present invention, these substances must be avoided or their amount must at least be restricted to a minimum, preferably not exceeding in aggregate 1 per cent of the dry batch.

I have also found that the incorporation of solid hydrates such as magnesium hydroxide, or solid easily hydratable substances such as caustic magnesium oxide is objectionable in the manufacture of products of low porosity according to the present invention, as the presence of such substances in the batch causes high porosity of the products under service conditions. For manufacture of ordinary forsterite refractories, caustic magnesium oxide is well apt, but for practicing the present invention, the caustic oxide has to be replaced by other types of magnesium oxide, such as dead burned or sintered or fused magnesite which is less easily hydrated. The word "dead burned magnesite" in the following also means its equivalents "sintered magnesite" and "fused magnesite." The amount of dead burned magnesite preferably shall not exceed about 35 per cent by weight of the fines and in most cases preferably shall not exceed about 25 per cent by weight of the fines.

The amount of solid hydrates and of easily hydratable substances shall be kept as low as possible and shall preferably not exceed in aggregate 2 per cent by weight of the refractory. The amount of uncalcined serpentine, if present in the finely divided parts of the batch, preferably shall not exceed 5 per cent by weight of the dry entire batch and shall be kept as low as practically possible. Generally it is recommended for the manufacture according to the present invention to use dunite rocks which are poor in hydrated magnesium silicates, and it is recommended to avoid the incorporation of these and other hydrosilicates. The incorporation of such substances as clay, kaolinite, bauxite is not only harmful because they contain alumina, but also because they are hydrosilicates, respectively hydrates. The incorporation of aluminous cement is objectionable as it is also an easily hydratable substance, tending to increase porosity of the fired products.

The disintegration and grading of raw materials generally can be made in the same manner as in the manufacture of known refractories containing magnesium orthosilicate. The batch is made in part from granular material, for instance having a grain size between 0.3 and 8.0 mm., and in part from finely subdivided material in amount sufficient to fill the spaces between the particles of the granular material. Therefore the dry batch according to the present invention preferably should contain at least 25 per cent by weight of finely divided material to 75 per cent by weight of granular material, preferably at least 30 per cent of fine material. An upper limit of the relative amount of fine material cannot be given absolutely, but the very best results are being obtained with amounts of the finely divided materials not exceeding 60 per cent by weight and preferably not exceeding 45 per cent by weight of the entire material of the dry refractory. The balance of the refractory comprises granular material, the weight percentage of which are between 40 and 75 per cent, preferably between 55 and 70 per cent of the refractory, excellent results having been obtained with 60–65 per cent of granular material and 40–35 per cent of finely divided material.

The finely divided material preferably has to be finely subdivided, for instance in milling it in ball mills and the like, either by dry or wet milling to particle sizes, for instance between about 0.2 mm. and colloidal dimensions, such as 0.001 mm., or between 0.2 mm. and about 0.01 mm., these numbers, however, being mentioned only as examples, not as limitations.

The granular fraction of the most important refractories according to the present invention consists mainly or substantially of substances rich in magnesium orthosilicate such as comminuted natural olivine rock, especially dunite poor in iron compounds, or for instance of dense synthetic forsterite. The more finely comminuted constituents of the refractory, according to the present invention, consist of refractory substances which are stable at high temperatures in contact with magnesium orthosilicate. Such substances are, besides magnesium orthosilicate itself, or finely subdivided dunite rock, substances such as magnesium oxide, MgO, and certain refractory spinels, especially those spinels which contain only subordinate amounts of alumina or are free from alumina, such as magnesium ferrite $MgFe_2O_4$, magnesium chromite, $MgCr_2O_4$, and chromite ores, preferably such chromite ores which contain not more than about 12–14 per cent by weight of Al_2O_3. Each of those possible components of the finely subdivided fractions of the raw materials may be used as the sole or the dominating constituent of the matrix between the granules or of the filling between the granules, or there may be used any binary mixture, containing two of those components, for instance magnesium oxide and chromite ore or magnesium ferrite as described. Again, mixtures of fines containing more than two components may be used containing at the same time magnesium orthosilicate, magnesium oxide and for instance chromite ore poor in alumina.

The amount of moisture which is incorporated into the batch for plastifying it prior to the moulding or prior to other processes of making consolidated bodies, such as bricks, shapes, lin-

ings, has to be limited not to exceed about 6 per cent by weight of the total weight of the dry refractory and it shall preferably be less than 5 per cent by weight, such as for instance between 3 and 5 per cent by weight. As the minimum amount of moisture which is necessary for plastifying is dependent upon the exact composition and particle grading of the batch, it is recommendable to find that minimum percentage by separate tests, as I have found that each per cent of moisture in excess of that minimum causes about 3 per cent increase of porosity. The word "moisture" means such substances as water, aqueous solutions, other liquids and solutions such as for instance oils. For effecting the cold bonding of the shaped products bonding materials known in the art of making refractories may be used, such as cellulose waste liquour (lignine liquor), solutions of molasses, treacle, and very small amounts of boric acid, the last substance restricted to less than 0.5 per cent of the weight of the dry refractory. A very useful bonding material is a solution of magnesium chloride, especially when the finely divided fractions of the refractory contain magnesium oxide. The magnesium chloride has a bonding effect on dead burned, sintered or fused magnesium oxide, when used in accordance with the present invention; in earlier manufacture the presence of caustic magnesium oxide has been considered to be preferable for that type of chemical bonding. The amount of $MgCl_2$ has to be small, preferably between 0.1 and 0.5 per cent by weight of the dry refractory.

Some difficulty may arise in mixing a very small amount of moisture, for instance 3 or 4 per cent by weight of the dry refractory batch, intimately with the refractory substances, composed of granular material and of finely divided material. It has been found that one suitable manner of incorporating the whole or part of the moisture into the batch is as follows: A fraction of the dry materials is wet milled together with the whole or part of the moisture in order to form a finely milled pulp containing that amount of moisture which is sufficient or nearly sufficient for plasticising the batch. This wet pulp is then mixed with the dry materials. In some cases it is preferable to use another part of the moisture to moisten the granular fractions and afterwards to mix the moistened granular fractions with the moistened fines. In many cases it is found advantageous to have about one sixth to one half of the fines wet milled, preferably about one third of the fines, with an amount of moisture which corresponds to about 2.5 to 4.5 per cent by weight of the total dry materials of the refractory. In wet milling such substances as magnesium oxide care must be taken to avoid the formation of objectionable amounts of magnesium hydroxide and magnesium carbonate. Wet milling therefore has to be limited to a short time, for instance it has been found that milling of sintered magnesite in water for 4 hours in a ball mill does not form objectionable percentages of magnesium hydroxide, if not more than 10 per cent by weight of such wet milled magnesite is incorporated into the refractory and if the wet milled materials are worked up within about 3 days after the wet milling, these data being mentioned as an example, not as a limitation.

In order to obtain as dense a packing as possible, within the limits of commercial economy, the effects of moulding, ramming, jolting, vibrating, pressing or hydraulic pressing can be used in the making of shaped products from the batch, according to methods well known in the art of making refractories. In most cases such moderate hydraulic pressures as between 100 and 300 kg. per sq. cm. have been found to be most satisfactory for manufacturing excellent products in combination with the other steps of manufacture according to the present invention. Higher pressures, for instance up to 1000 kg./cm.^{2} may be recommended only in some cases for products containing less than 60 per cent by weight of granular material, as the brittle granules otherwise are apt to be crushed. Also the high initial costs for high pressure hydraulic equipment and the heavy wear on the moulds in the case of very hard materials such as dunite make it preferable not to operate with excessive pressure.

The shaped products have to be dried and burned. In some cases the unfired products can be shipped and firing effectuated in the furnaces where the products are being utilized. Chemically bonded unfired products, manufactured according to the present invention, as well as the fired products can be used in manners known to the art for constructing furnaces and the like, for instance reinforced by metallic mantles, sheaths or plates, which wholly or in part cover the refractory shaped bodies or are inserted between the refractory bodies. Thereby the expensive step of firing to very high temperatures is avoided. The products in that case can be shipped either unfired or after firing to comparatively moderate temperatures, sufficient to ensure a ceramical bond.

In most cases it is preferable to include the process of firing in the manufacture; that is especially the case if a further reduction of porosity shall be effectuated by means of firing to such temperatures at which shrinkage of the shaped products takes place. In such cases the process of burning has to include heating to shrinkage temperatures which for these highly refractory products I have found to be between 1550° and 1730° C. The temperature and duration of firing depend somewhat on the exact composition of the refractory and have to be found by means of separate test. In manufacture of refractories containing considerable amounts of magnesium orthosilicate, such as refractories containing more than 50 per cent by weight of dunite, substantial shrinkage during commercial firing of shaped bodies hitherto has been carefully avoided, because of the risk of objectionable deformation during such firing. I have found, however, that refractories made according to the present invention, containing neither objectionable bonding materials nor hydrates or easily hydratable substances and comprising a large percentage of granular comminuted dunite, especially from 55–65 per cent by weight, besides finely milled material prepared and moulded as described, can be subjected to considerable shrinkage by means of firing without objectionable deformation of the shapes, the allowable shrinkage amounting up to more than 2 or even more than 4 per cent by volume. By such firing shrinkage the porosity can be reduced considerably. The process of firing can be made in oxidizing, neutral or reducing atmosphere; most effective, under same conditions of temperature, is heating in reducing atmosphere. Excessive shrinkages, for instance in excess of 10 per cent by volume, are not to be recommended.

There are thus several steps in the process of manufacturing which are either necessary or useful for obtaining, in accordance with the present invention, a highly refractory bonded product having low porosity, from raw materials containing magnesium orthosilicate, especially from such materials which comprise not less than 50 per cent by weight of magnesium orthosilicate.

The first step is the selection of suitable raw materials, avoiding hydrates, easily hydratable materials and avoiding certain bonding materials which hitherto have been common constituents of forsterite refractories.

The second step is a suitable grading of grain sizes, including a large percentage of granular material, such as comminuted dunite rock. This second step is not materially different from earlier manufacture of forsterite refractories.

The third step is the incorporation of a strictly limited amount of moisture into the batch.

The forth step is the making of shaped bodies from the batch.

The fifth step is the drying of shaped bodies.

The sixth step is the firing of the dried shaped bodies, including a process of shrinkage which has not hitherto been used for manufacture of commercial forsterite refractories.

Examples

1. An olivine rock (dunite) having a composition of approximately 42 per cent by weight of SiO_2, 49 per cent of MgO, 7 per cent of FeO, 1 per cent of Cr_2O_3, 1 per cent of H_2O is comminuted to grain sizes between 0.3 and 0.6 mm. for the granular material and to finely milled material for the fine particles. The finely milled material, prepared by milling in a ball mill, has to pass 90 per cent by weight through a screen of 0.08 mm. mesh width. A batch is provided from 60 parts by weight of the granular material, 40 per cent by weight of the finely milled material and 4 parts by weight of water and 1 part by weight of concentrated cellulose waste liquor (lignine liquor). The mixture of water and cellulose waste liquor is used in such a manner that 1.5 parts of the liquid is used for moistening the granular material, 3.5 parts by weight of liquid are used for moistening the finely divided material. After moistening the granular and fine material are mixed thoroughly, the batch is moulded into bricks in a hydraulic press under a load of 250 kg/cm². The bricks are dried and then fired at a temperature of 1580° C. for five hours. After cooling a shrinkage of 6 per cent by volume is observed. The burnt brick has a volume porosity of 21 per cent. After burning for 9 hours at 1700° C. the burnt brick has a volume porosity of 12 per cent.

2. The same dunite rock as in Example 1, is comminuted to give a granular material ranging in grain size between 0.5 and 4.0 mm., particles of the same rock which are less than 0.5 mm. are used for preparing the finely divided material. Dry milled fines are prepared in a ball mill to pass 85 per cent through a screen of 0.1 mm. openings. Wet milled fines are prepared in a ball mill from 3 parts by weight of dunite and 1 part by weight of a solution, made by dissolving 20 grams boric acid, H_3BO_3, and 100 grams of sugar molasses per 1000 grams of water. The wet milling results in a pulp. The batch is made in the following manner: 65 parts by weight of the granular dunite are moistened by 1 part by weight of the solution of molasses and boric acid described. A mixture is made from 25 parts by weight of dry dunite fines and 13.3 parts by weight of the wet dunite pulp, then the wet fines and the wet granular material are mixed, the resulting batch containing about 3.8 per cent by weight of moisture. The batch is moulded into shaped bodies under a pressure of 300 kg/cm². The dried shapes having a porosity of 20 per cent by volume can be used directly for the lining of furnaces and the like, without previous firing.

3. A dunite sand containing 42 per cent SiO_2, 47 per cent MgO, 8 per cent FeO, 1 per cent Cr_2O_3, 0.5 per cent CaO, 1.5 per cent H_2O is provided in grain sizes between 0.3 and 4.5 mm. to give a dense packing according to the Fuller curve. 60 parts by weight of such granular dunite sand and 40 parts by weight of a finely divided material are used, which finely divided material consists of comminuted dunite sand 75 per cent by weight, dead burned magnesite 25 per cent by weight. The composition of the dead burned magnesite is 93 per cent MgO, 3 per cent Fe_2O_3, 2 per cent SiO_2, 1 per cent CaO and 1 per cent loss by firing. The mixture of fines is milled for three hours in a ball mill. The milled fines are moistened with a solution of 200 grams of magnesium chloride hydrate, $MgCl_2.6H_2O$, in 1000 grams of water, using 8 parts by weight of that solution per 100 parts by weight of fines, 100 parts by weight of the granular material are moistened with 2 parts by weight of the same solution. Afterwards moistened fines and moistened granular material are thoroughly mixed, moulded into shapes under a pressure of 260 kg/cm². The shapes are dried at temperatures up to 130° C. and fired at 1650° C., after cooling the shrinkage is found to be about 3 per cent by volume. The fired refractory building material has a volume porosity of 19 per cent.

4. A refractory building material is made from dunite rock, described in Example 1, the dead burned magnesite described in Example 3 and a chromite ore, containing 49 per cent Cr_2O_3, 13 per cent Al_2O_3, 20 per cent iron oxides, 14 per cent MgO, 4 per cent SiO_2. The granular material is made from comminuted dunite, grain size between 0.5 and 4.0 mm. The fine material is composed from 20 per cent by weight of dead burned magnesite and 80 per cent by weight of chromite ore. The mixture of magnesite and chromite ore is milled in a ball mill until 90 per cent pass a screen of 1.0 mm. mesh openings. For moistening the fines and the granular material a solution of 200 grams magnesium chloride hydrate, $MgCl_2.6H_2O$, per 100 grams of water is used. For making the batch 60 parts by weight of granular material and 40 parts by weight of finely milled material are used. The 60 parts by weight of granular material are moistened with 1 part by weight of the magnesium chloride solution, the 40 parts of fines are moistened with 3.8 parts by weight of the same solution, afterwards granules and fines are intimately mixed, then moulded into bricks under a pressure of 260 kg/cm². dried at 130° C. for 24 hours, then fired at 1650° C., that maximum temperature being held for 8 hours. After burning no measurable volume shrinkage is found, however; due to the absence of objectionable hydrates and the limited amount of plasticising liquid, the porosity of the product is only 19 per cent by volume. If the same type of brick is fired at 1720° C. for 8 hours, the volume shrinkage is found to be 5 per cent and the porosity of the burned product is 14 per cent by volume.

5. The raw materials and the manner of manufacture are the same as in Example 4, the only difference being that the brick and other shapes

are used after moulding and drying, without having been fired, the porosity of the unfired brick being 19 per cent by volume.

6. The same raw materials are used as in Example 4, also the same manner of manufacture, the only difference from Example 4 being that the finely divided material is composed of from 50 per cent by weight of chromite ore, 30 per cent by weight of finely divided dunite and 20 per cent by weight of dead burned magnesite.

These examples have illustrated some important types of refractories which may be manufactured according to the present invention. However, the manufacture and use of refractories of low porosity containing substantial amounts of magnesium orthosilicate is not limited to those refractories in which dunite rock, synthetic forsterite and the like are the main constituents, and which preferably contain not less than 50 per cent by weight of magnesium orthosilicate; but the method may equally well be applied to refractories which contain for instance about 30 to 50 per cent of magnesium orthosilicate such as certain magnesite, chromite and chrome-magnesite refractories. Also for such refractories the disadvantage of peeling off can be reduced or eliminated by reduction of porosity in accordance with the present invention.

According to the provisions of the patent statutes, I have explained the principle of my invention and have described what I now consider to be the best embodiment. However, I desire to have it understood that the invention may be practised otherwise than specifically described.

VICTOR MORITZ GOLDSCHMIDT.

Published May 11, 1943

Serial No. 353,978

ALIEN PROPERTY CUSTODIAN

METHOD AND DEVICE FOR PRODUCING WAX RIBBONS FOR MECHANICAL SOUND RECORDING

Richard Ruhnau, Berlin-Tempelhof, Germany; vested in the Alien Property Custodian

Application filed August 23, 1940

The invention relates to a method for producing wax ribbons for mechanical sound recording purposes by coating a ribbon-shaped carrier with a wax layer capable of being cut, as well as to a device for carrying out this method.

It is known to deposit thin layers of an insulating substance upon ribbon-shaped carriers, for example film bands. Thus, in the production of films, a method is used in which the photographic emulsion of the film band is coated with a thin layer of paraffin. The device used for this purpose materially consists of a set of rollers taking up the liquefied paraffin and transferring it to the gelatine layer of the film by drawing the film, against the direction of rotation, over the continuously rotated roller carrying the paraffin and being kept at a certain temperature, a certain pressure being required for uniformly transferring the paraffin to the gelatine layer.

Slight deviations in the thickness and uniformity of such a layer are, however, admissible, as in the mentioned method it is exclusively the question of depositing an insulating coating upon the carrier of the photographic picture in order to protect it against chemical actions.

It is a considerably more difficult task if, instead of the simple insulating coating, a wax layer of such a thickness and composition and of such a uniformity is to be deposited upon a ribbon-shaped carrier as to render it suitable for mechanical sound recording. The wax compositions used for this purpose have such a high melting point that the ribbon must be prevented from touching the transferring roller, which is kept at a corresponding temperature, as the ribbon, whether it consists of a film or of paper, will be at least deformed, if not destroyed, by heat. Moreover, it is exceedingly difficult to absolutely avoid the formation of air bubbles in depositing the wax, such air bubbles rendering a wax-coated ribbon unsuitable for sound recording. Owing to this difficulty, devices have not been known hitherto for depositing an absolutely homogeneous and uniformly thick wax layer, capable of being cut, upon a ribbon-shaped carrier of any desired length.

The object of the invention is to obviate these difficulties. This is achieved, in the first place, by continuously feeding the liquid wax composition in a layer of uniform thickness to the ribbon shaped carrier moved at a uniform speed, and by damming the flow of liquid by means of the ribbon-shaped carrier, preventing direct contact between the said carrier and the wax feeding element.

If the wax composition is fed to the ribbon-shaped carrier by means of a roller, the retaining of the flow of liquid will cause an accumulation of wax filling the space between the ribbon and the roller, which accumulation may be termed as damming wave. The uniformity of the damming wave formed and kept as if in a state of rest while the wax coating process is going on, is attained according to the invention by keeping the thickness of the wax layer fed to the place of application below the thickness of the wax layer on the ribbon-shaped carrier and by accordingly increasing the rate of flow of the fed wax layer. The proportion between the rate of flow of the wax to the place of application and the linear speed of the ribbon-shaped carrier should, as thorough experiments have shown, preferably be made about 5 to 1.

In feeding the wax layer to the place of application by means of a roller, it is advisable to keep the thickness of the wax layer fed by the roller so small as not to exceed a few hundredths of a millimetre. Furthermore, the velocity of rotation of the feeding roller is preferably kept below the empirically determined critical velocity at which the wax layer has the tendency to accumulate on the central portion of the roller.

The space between the ribbon-shaped carrier and the feeding roller, the velocity of this roller and of the ribbon, and the thickness of the wax layer fed by the roller should be adjusted so that, in the final result, a complete consumption of the wax fed without air bubbles is made possible by a most uniform application to the running ribbon without the ribbon touching the roller.

The device for practising the method according to the invention preferably consists of a set of rollers with one bailing roller, one feeding roller, and one ribbon conveying roller, the feeding roller and the ribbon conveying roller being driven in the same direction of rotation but at different circumferential velocities.

The bailing roller is preferably driven by the feeding roller, the bailing roller being pressed by a spring or a weight against the circumference of the feeding roller.

However, in order that a wax layer of appreciable thickness may be deposited upon the feeding roller, the invention provides that the bailing roller has a groove-shaped cross section at its circumference and is arranged with respect to the feeding roller in such a way that only its edge

ribs touch the circumference of the feeding roller.

A device according to the invention is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a diagrammatical side view of the invention,

Fig. 2 is a section of the device taken on the line II—II of Fig. 1,

The wax composition is liquefied in a heated crucible **1**. A roller **3**, hereinafter called bailing roller, mounted to rotate on an arm **2** pivotally connected by a universal joint, partly dips into the melted substance and is rotated by a mechanically driven roller **4**. A spring **5**, attached at one end to the arm **2** and at the other end to a stationary part of the device, draws the bailing roller **3** towards the circumference of the roller **4**. As will be seen from Fig. 2, the bailing roller **3** is provided at its circumference with a rather wide groove **6**, the depth of which is so dimensioned that a sufficient quantity of the wax composition will be permitted to pass between the rollers **3** and **4** and will be supplied to the roller **4**. The edge ribs **7** touch the straight generatrix of the roller **4**.

The bailing roller **3** in its rotation takes up wax from the crucible **1** and transfers it to the upper roller **4** which is preheated by suitable means, for example by electricity, sufficiently that the melted substance should not cool on the surface of this roller. The wax layer deposited upon the roller **4**, hereinafter called feeding roller, is partly removed by an adjustable knife-shaped stripping plate **8** and returned into the crucible. The rest of the wax layer remaining on the feeding roller is free from bubbles and partakes completely uniformly in the rotation of the feeding roller.

A roller **9**, arranged opposite the feeding roller **4**, serves to convey the ribbon **10** to be provided with the wax layer. The ribbon conveying roller **9** is adjustable with respect to the feeding roller **4**, and both rollers turn in the same direction. In operating the device, the ribbon conveying roller is moved towards the feeding roller by means of a suitable shifting device so far as to cause the wax layer to slightly touch the ribbon arriving in opposite direction whereby the liquid wax is dammed, thus ensuring the uniform transfer of the melted substance to the ribbon.

The best results are obtained if, by means of the stripper **8**, the thickness of the wax layer is reduced to a few hundredths of a millimetre, and if the circumferential velocity of the feeding roller **4** is considerably increased with respect to the running speed of the ribbon so that the circumferential velocity of the roller **4** and the running speed of the ribbon are in the proportion of about 5 to 1.

Although the formed damming wave is of a high temperature, the arriving and not pre-heated ribbon is able to resist the heat rays without any difficulties since this heat radiation is only for a short time, and distributing and carrying off the heat is possible to a great extent if there is no direct contact with the central roller **4** which has a high temperature and constantly keeps it.

Furthermore, it was found that the operating speed of the device is limited by the fact that the wax layer, if the roller **4** rotates too quickly, has the tendency to accumulate to an elevation in the centre of the roller, whereas the edges of the roller are nearly free from wax.

The optimum operating speed is easily found by experimenting, if regulating means are provided for the driving motor. It has also been found to be advantageous to operate strippers at the roller **4** in such a way that any wax adhering to the sides of the roller is also returned into the crucible, as it would otherwise lead to thickening of the edges of the layer.

Finally, it was found advisable to make the width of the wax rollers **3** and **4** a little smaller than the width of the ribbon to be coated with the wax. The object of this is to prevent the liquid wax from running over the edges of the ribbon.

RICHARD RUHNAU.

PUBLISHED	R. RÜHNAU	Serial No.
MAY 11, 1943.	METHOD AND DEVICE FOR PRODUCING WAX RIBBONS FOR MECHANICAL SOUND RECORDING	353,978
BY A. P. C.	Filed Aug. 23, 1940	

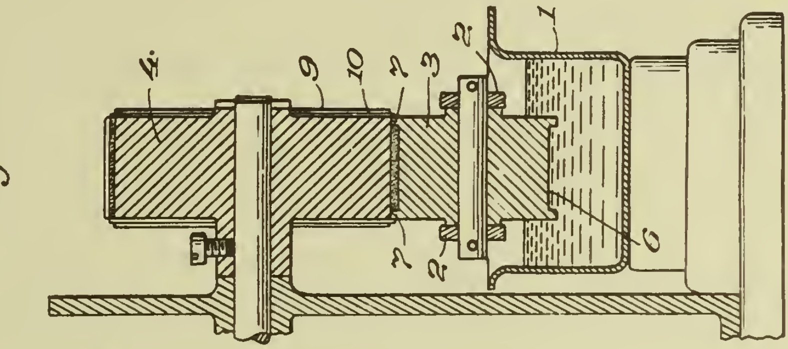


Fig. 2.

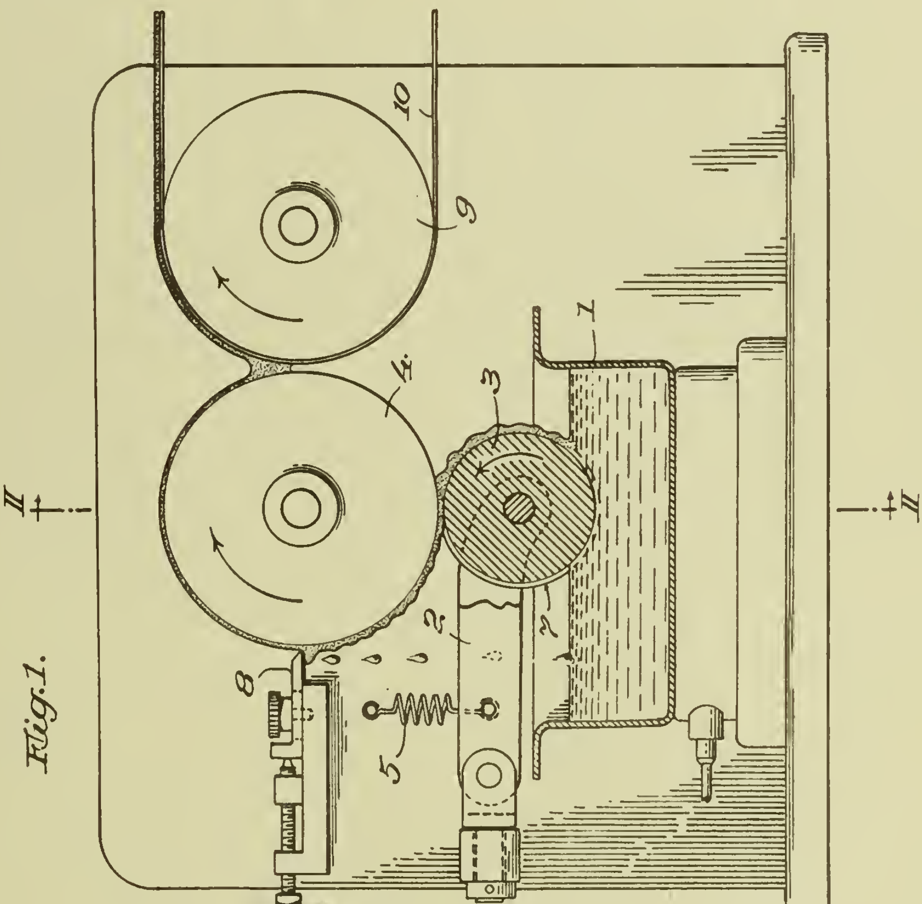


Fig. 1.

Inventor:
Richard Ruhnau,
By: Mason & Porter
Attorneys

Published May 11, 1943

Serial No. 354,393

ALIEN PROPERTY CUSTODIAN

METHOD OF PRODUCING AN ARTICLE IMPREGNATED WITH SYNTHETIC RESIN

Nagao Hayami, Nishinomiya City, Japan; vested in the Alien Property Custodian

No Drawing. Application filed August 27, 1940

This invention relates to an improved method of preparing a material which does not absorb water, and which is compact and strong, by impregnating a porous basal body with synthetic reaction.

For a basal body, which is to be impregnated with synthetic resin, either a fired earthenware or a fibrous, porous, mouldable product is employed. The fired earthenware is made from clay containing aluminium silicate as the chief component, or to which is added dolomite powder, feldspar powder, or some other such potter's clay, which is moulded into a desired form and fired until the clay reaches the point of vitrification. The fibrous, porous, mouldable product is made by mixing a fibrous matter like asbestos, or rock fiber, with cement mortar, or gibses, or clay, and then hardening it in the forms desired.

The synthetic resin for impregnating the basal body is in the early state of condensation or polymerisation, that is the condensation or polymerisation reaction being increased very slightly, and which is in the form of a solution. After the basal body has been impregnated with this resin in liquid form, heat treatment is employed, by which the condensation or polymerisation reaction is carried out and the impregnated resin is hardened by completing the synthetic reaction.

The object of this invention is to produce nonwater absorbing articles which excel in resisting corrosive elements, in insulating electricity and in strongness.

In order that the said invention may be clearly understood, the same will now be described more fully by way of the following examples:

Example I.—Take 60 to 75 parts of clay, containing aluminium silicate as the chief component, mix with 20 to 30 parts of dolomite powder and 5 to 6 parts of feldspar powder. These are kneaded together. The mixed earthenware material described above is moulded into the required form and dried. This is inserted into a kiln, or a furnace, and fired until it begins slightly to vitrify (commonly vitrification starts at a temperature of 1150° C.).

In this way a biscuit is prepared which is niserted into a closed vessel, from which the air has been extracted under a temperature of about 80° C. When the gases in the pores of the biscuit have been extracted, the vessel is filled with the early condensation product of phenol and formaldehyde, which has not reached what is called the A state, so it shows a condition of solution, viz. a molecular state. The pressure in the closed vessel is increased and the pin-hole pores of the biscuit are completely impregnated with the condensation solution described above.

Drain the surplus condensation solution from the closed vessel and dry the impregnated biscuit. Then put the treated biscuit in a heating box, applying a pressure of about 200 lbs. per square inch, holding this pressure of about 200 lbs. a short time under a temperature of 180° C. This increases the condensation reaction of the solution and hardens it. The biscuit produced by this method absorbs liquid much more readily than does commonly prepared porcelain, therefore, when impregnating it with synthetic resin, the condensation solution can easily and in high density be suffused deep into the body. Moreover, since the early state of the condensation solution has a high osmotic character, the above impregnation becomes all the more thorough.

Besides, when the impregnating operation begins, the biscuit is first heated and the gas involved in its pores is fully extracted, making an excellent state for thorough impregnation is with the resin solution. Therefore, the impregnation is all the more easily accomplished deep into the biscuit at a high density.

A product made by this process has high excellence, characterised by not absorbing water and being much stronger and acid-resisting than the substance prepared by impregnating an ordinary base of porcelain or earthenware with a resin solution.

Example II.—Take 70 parts of clay, of which the chief component is aluminium silicate, mixed with 30 parts of asbestos powder. Knead them with a diluted water solution of sodium silicate. After this has been moulded to the required form and dried, subject it to a temperature below 300° C. The substance thus prepared may be employed as a basal body, into which the synthetic resinous condensation product in its early state as mentioned in Example I is impregnated through the same method as in the case of Example I. The impregnated solution is then hardened, by heating.

This method has many advantages. The operation is simple and there is no danger of deforming or causing cracks in the basal body since high temperature is not required to make the basal body.

An article can be obtained which is by no means inferior to products using as basal body fired earthenware produced by high temperature, in the point of not absorbing water, resist-

ing corrosives, and having strength and hardness.

Example III.—Mix 12 parts of asbestos powder with mortar prepared by adding 7 parts of water to 3 parts of Portland cement. When thoroughly mixed, insert the substance in a mould and press the excess cement mortar from the cement mat. After the cement mat has coagulated in the mould, remove and dry it.

In this manner, asbestos fibres can be fixed in any form desired by employing cement. The base prepared in this manner is filled with minute pin-hole like pores. This is impregnated with the synthetic resin solution as in Example I and subjected to hardening treatment to obtain the product desired.

Example IV.—Furthermore, by heating the articles prepared by the methods described in Example I to a temperature of about 400° C. Until the impregnated synthetic resin is carbonized or semi-carbonized, and then again impregnating it with fresh synthetic resin solution and hardened as described before. Articles obtained in this manner have a high resistance against corrosives and are suitable to use as pans to use for high temperature reactions.

NAGAO HAYAMI.

Published May 11, 1943 Serial No. 354,762

ALIEN PROPERTY CUSTODIAN

SYSTEM FOR DISBARKING TRUNKS

Anton Holzhey and Fritz Holzhey, Schongau A. Lech, Germany; vested in the Alien Property Custodian

Application filed August 29, 1940

This invention relates to a process and device for stripping bark from trunks.

Various processes and devices are known for removing bark or rind and bast from trunks. It has been suggested to apply acids, sand-blasting or other mechanical means such as revolving blade rollers for this purpose.

The process of placing the trunks in revolving drums filled with water is also known. In this way the bark would be softened by the water and then peeled off by the trunks rubbing against each other as well as against certain projections on the inside walls of the drums. It has finally been suggested to expose each single trunk to the effect of water sprays under pressure and pushing the trunk by mechanical means against the direction of the sprays.

The said methods as well as other known processes embody great disadvantages. Above all, acids and sand-spraying are not suited for the treatment of high-quality wood since its quality is greatly impared thereby. On the other hand, when mechanical stripping means are used, such as rotating blades and the like, there will be a considerable loss of material in stripping. Moreover, the treatment of the wood in revolving drums requires must time and results only in insufficient stripping. Besides, special driving apparatus is required for rotating the drums which also require considerable space, capital investment and operating expenses.

The present invention has among its objects to remove said disadvantages by using a process in which several trunks of wood placed in a vessel are stripped simultaneously by directing water sprays under pressure against the trunks in such a way that these are made to push and rub constantly against each other as well as against the walls of the vessel. Simultaneously through the water sprays under pressure the bark is thus removed. Through the chafing and rubbing as well as through the soaking effect of the water, the bark is loosened, while the intense water sprays under pressure tend to lift the same and cause it to be carried off through suitable openings provided in the vessel. In this way a thorough stripping of the bark is accompanied with a minimum of energy. Moreover, there will be no further loss of material and the whole stripping process is carried out within a very short time.

Another object of the present invention is the provision of a specially shaped device for carrying out the inventive process, consisting of a stationary vessel, preferably of cylindrical shape, which over a part of its circumference and especially on its lower half is equipped with suitably pointed nozzles for injecting the water under pressure. This vessel also has horizontal longitudinal slots, especially within the range of the said nozzles, as well as ribs and/or projections extending towards the inside over the whole circumference of the vessel.

Such contrivance is simple in its construction, occupies little space and is easily and cheaply produced.

The invention and the advantages derived from the same will be better understood by reference to the following detailed description of the device in connection with the accompanying drawing showing by way of example and purely schematically some embodiments and characteristics of the invention and in which:

Fig. 1 is a perspective view of a plant having the invention applied thereto.

Fig. 2 is a cross section through the stripping vessel on the line II—II of Fig. 1.

Fig. 3 is an axial section through a plant similar to Fig. 1.

Fig. 4 is a diagram showing the circulation of the working agent.

Fig. 5 is a diagrammatic plan view of a plant including a plurality of working drums.

Similar characters of reference denote similar parts in the figures.

Referring now to the drawings in greater detail, the apparatus comprises a stationary vessel 1 in the shape of a horizontal drum which is mounted in and partly surrounded by a box-shaped enclosure 2.

The vessel 1 is provided with ribs and projections over its whole inside circumference which can assume various shapes and forms. The illustration shows by way of example ribs consisting of U-irons 3 arranged at certain uniform intervals and extending in longitudinal direction of the vessel 1. The legs of said U-irons may be welded to the inside wall of the vessel 1. In the lower part of the vessel apertures are provided in the wall between the single ribs 3. These apertures consist of slots 4 running parallel to the U-irons 3 and extending in longitudinal direction not quite as far as the walls of the vessel. The water pressure nozzles 7, which are provided on the lower half of the circumference of the vessel, on feed pipes 7', protrude through the said slots 4 towards inside. These nozzles are distributed side by side at comparatively short intervals so as to form a certain number of rows of nozzles which corresponds with the number of

slots 4 available. The mouths of said nozzles lie below the outside surface of the ribs 3 which faces the inside of the vessel, and are thus protected against damage by the logs. Furthermore, the axes of said nozzles are lined up so that their extensions as referred to the cross section of the vessel, would run like the chords of a circle, see Fig. 2. If desired, the axes of all nozzles or of a part thereof can simultaneously be made to run at a slope to the longitudinal direction of the vessel, as indicated in Fig. 3, so that beside the rotating movement the logs are given simultaneously a push forward in the direction of the longitudinal axis of the vessel.

It is also possible to mount the nozzles for moving or adjusting so that the direction of the emitting water sprays under pressure can be regulated with relation to the logs. The changes required for this purpose will readily occur to those skilled in the art and, therefore, have not been illustrated.

The single nozzles are connected with the pressure water line 5 which is fed from any pressure water source of known type, for example, a pump 16, Fig. 4. The feed line for the pressure water should have some means of adjusting as for instance the valve 6.

An intermediary bottom 2'' with inclined walls is mounted inside the housing 2. At its lowest place the intermediary bottom has been provided with a drain 17 of large dimension, fig. 2, for the used pressure water and the bark. It is particularly emphasized that also with relation to this arrangement, other ways or means can be devised for draining the used water and the bark.

The drum-like vessel 1 is equipped at both front ends with slides 8 and 9 operating within slots in the housing 2, i. e., manually, mechanically, electrically or hydraulically. In the illustration said slides are hung on chains or ropes 10 which run over guide rollers 11 and are balanced by a counter weight 10' so that they can easily be worked by hand.

In front of the stripping vessel 1 another vessel 12, Fig. 1, preferably in trough shape, has been placed which can be filled with the round logs 14 to be stripped, by way of a chute 13, a conveyer 18, 19, Fig. 3, or by some other appropriate means. The logs collected in the vessel 12 form a bundle which by the punch 15 operated by manual, hydraulical, mechanical or electrical means is pushed into the stripping vessel 1 after the slide 9 has been previously opened. The slides 9 and 10 are then lowered so that the vessel 1 is closed. Now the cock 6 is opened allowing the water under pressure to enter through the nozzles 7 into the vessel 1 where it strikes against the logs almost tangentially causing them to revolve around their longitudinal axis. Simultaneously the whole bundle of logs turns around its own axis so that the single logs jostle and rub each other as well as against the ribs 3 fastened to the vessel. Owing to this jostling and rubbing mechanical action as well as through the softening effect of the water, the bark is loosened so that it can be lifted by the vital force of the pressure water sprays and through the slots 4 together with the used water is conducted into the collecting trough 2, whence it is drained by way of the pipe 17 mentioned above.

The whole stripping process is carried out at a considerable speed and in many cases is already finished after a period of 25 to 45 seconds figured from the time the pressure water sprays have started acting upon the logs. The supply of pressure water is then shut off by closing the cock 6. The two slides 8, 9 can now be opened and a new bundle is pushed into the vessel by means of the punch 15. Through this shoving-in of the new bundle, the ready stripped trunks are simultaneously pushed out in front upon a conveyer, a wagon or other means of transportation to be carried off to their destination.

The contrivance also serves for cleaning stripped logs which have become dirty in storage or during transportation or to liberate them from snow and ice in the winter.

In the case of larger plants it is advisable to set up side by side several of the described contrivances 1, 2, as shown in Fig. 5, and to feed them from a common conveyer 12, which makes continuous operation possible. As best seen in Fig. 3, the conveyer belt 18 in this case is disposed at the level of the center axis of the drum 1, and supported on rollers 19, while the punch 15' takes a semi-circular form.

The bark which has been ejected from the vessel 1 through the slots 4 is appropriately collected by means of screens 20, Fig. 4, and conveyed to some place for further use. Since the stripping waste received during the inventive process consists of uniform material and does not contain any pieces or parts of wood, it can be treated for other purposes in one and the same working process. This has not been possible heretofore with any known processes, as the stripping waste received contained bast and wood which are difficult to separate from each other. The bark obtained from this inventive process can either be treated for cellulose or it can be used as litter or used for insulating purposes (cork substitute).

After the water has been liberated from the bark it can be re-circulated, but it is advisable to put it through a purifying process before further use. A plant of this type has been shown in Fig. 4. The water together with the bark and bast are directed from the drain pipe 17 through a filter and sieving device 20, for removal of bark, bast and other impurities from the water, and re-cycled through pump 16, with addition of fresh water through pipe 21 to make up for the unavoidable waste which is due to absorption of water by the wood and bark, evaporation, leakage etc.

It might be recommended to carry out the stripping process by using alternately cold and hot water sprays. These sudden changes of temperature will bring about an expansion which will even accelerate the loosening of the bark. It has also been tried to operate with variable water pressure, first applying water with a higher pressure and later on lowering the pressure. For example, the water might first be ejected with 12 at. from the nozzles 7, then with 8 at. and then again with a higher pressure. It is also possible to operate with alternately hot and cold water sprays of a constantly changing pressure. In this case, hot water is applied for the low-pressure sprays which serve to soak the bark and cold water for the high-pressure sprays. A system of this kind has been embodied in Fig. 4, showing an additional branch including a water heater 22 having steam feeding and exhaust pipes 23 and 24, respectively. Thus, hot or cold water may be delivered alternatively to the delivery pipes 7' of the nozzles 7, by operation of a three-way valve 25. If desired, the three-way valve

may be mechanically coupled with the pressure-control valve **6**, as by a rod **26**, so as to bring about the reduction of pressure simultaneously with the change-over to hot water, in accordance with the procedure suggested above.

If continuous operation is desired, a longer vessel should be used in which the nozzles are mounted in such a way that the emitting sprays will cause the logs to revolve not only around their own longitudinal axes but simultaneously cause them to be moved forward in the direction of the axis of the vessel, as shown in Fig. 3. For the same purpose, the nozzles can also be arranged along a helix, or certain worm-like installations could be provided which through their action and guidance would automatically move the logs forward longitudinally.

The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described.

ANTON HOLZHEY.
FRITZ HOLZHEY.

PUBLISHED	A. HOLZHEY ET AL	Serial No.
MAY 11, 1943.	SYSTEM FOR DISBARKING TRUNKS	354,762
BY A. P. C.	Filed Aug. 29, 1940	2 Sheets-Sheet 1

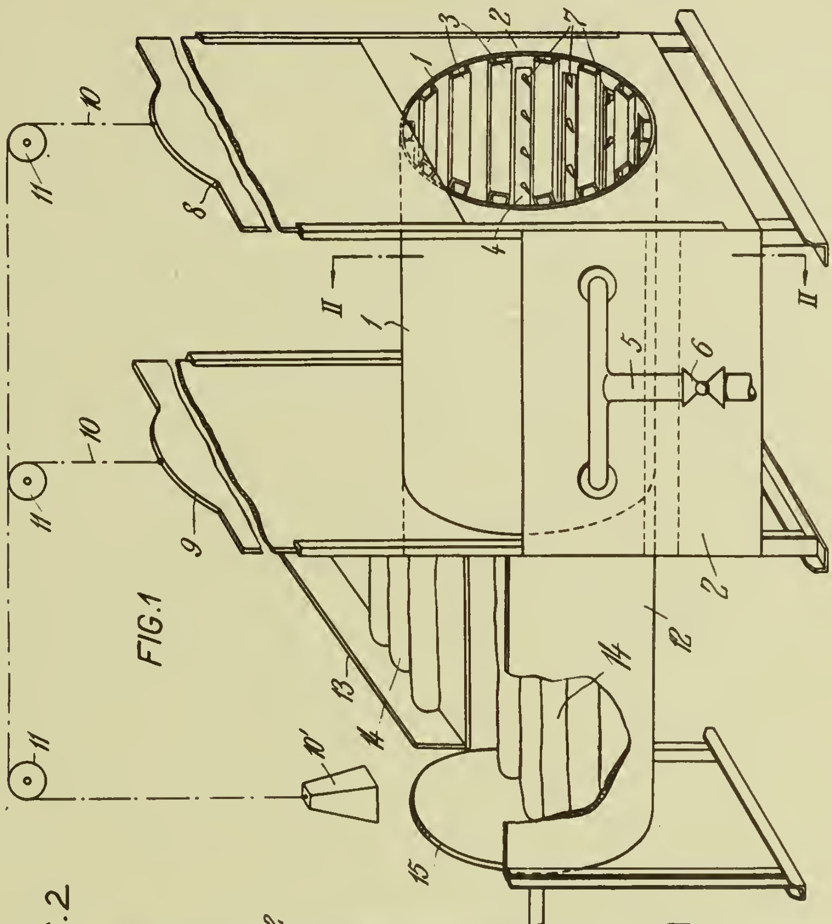


FIG.1

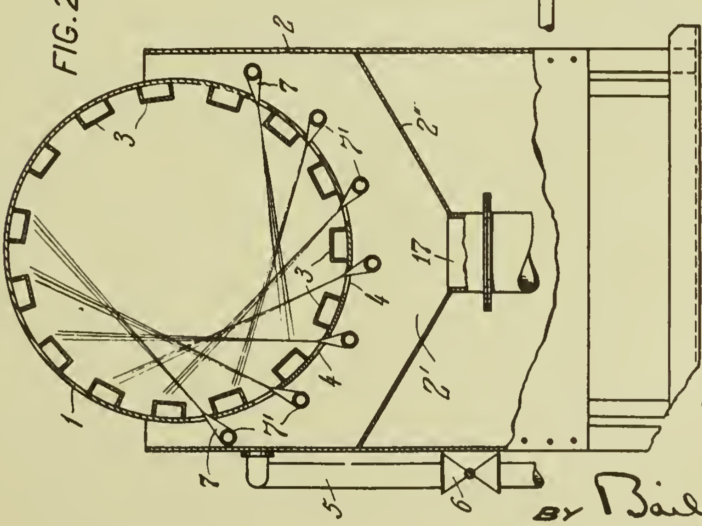


FIG.2

Inventors
ANTON HOLZHEY,
FRITZ HOLZHEY,

BY Bailey & Larson
ATTORNEYS

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. HOLZHEY ET AL
SYSTEM FOR DISBARKING TRUNKS
Filed Aug. 29, 1940

Serial No.
354,762
2 Sheets-Sheet 2

FIG. 3

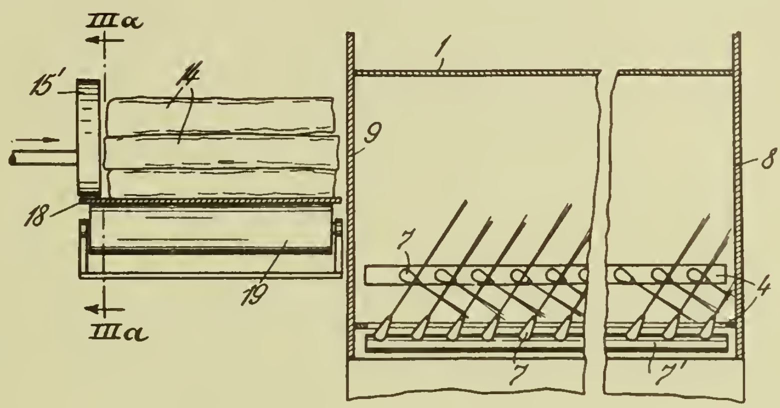


FIG. 4

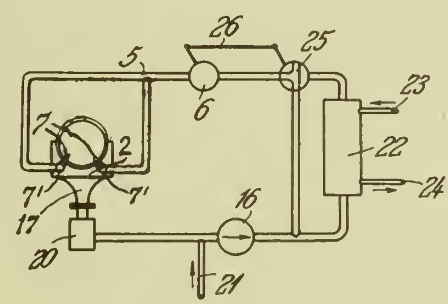


FIG. 5

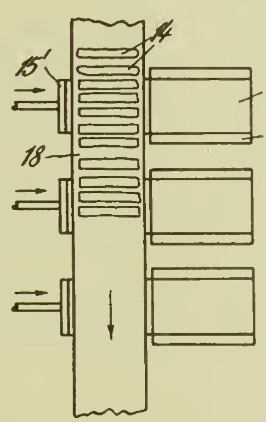
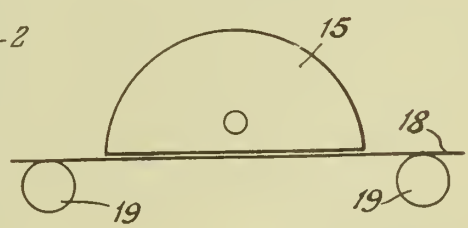


FIG. 3a



Inventors
ANTON HOLZHEY,
FRITZ HOLZHEY,

BY Bailey & Larson

ATTORNEYS

Published May 11, 1943 Serial No. 355,270

ALIEN PROPERTY CUSTODIAN

PRODUCTION OF METALLIZED DIELECTRIC MATERIALS

Hermann Sträb, Sillenbuch, and Walter Dorn, Stuttgart, Germany; vested in the Alien Property Custodian

No Drawing. Application filed September 3, 1940

This invention relates to a process of producing metallized dielectric materials, particularly paper.

It has been proposed to produce a condenser dielectric by applying to one side of a dielectric material an insulating coating, for instance varnish, which fills the pores and depressions in the surface of the material and on which the metal layer is deposited by a vacuum process, as the application of metal vapors or the disintegration of the cathode material. The purpose of this method is to fill the holes and cavities always present in the surface to be metallized of the dielectric with an insulating and therefore dielectrically acting substance, so that the metal layer deposited thereon rests on a perfectly level support and is prevented from entering such cavities and forming elevations which would interfere with proper working of the condenser.

Satisfactory action of a dielectric produced under this method depends, however, on the complete covering of the surface subsequently to be metallized by the insulating coating which, moreover, should be spread as uniformly as possible in view of the desired slight thickness.

It is the object of the invention to facilitate checking of the uniformity of the coating by adding coloring matter thereto.

According to the invention, the dyestuffs chosen are preferably such as will dissolve well in varnish solvents, so that coatings combining strong coloring with low thickness can be obtained. The coloring matter should, furthermore, not decompose during drying of the varnish and, above all, during subsequent metallization of the paper or other material while separating substances detrimental to the insulation or disruptive strength of the dielectric.

In further accordance with the invention uniformity of the coating is checked by moving the coated dielectric material, for instance a paper band, past a source of light. The transmitted light will then disclose all faulty spots where the coat is too thin or where the dried varnish shows hairline cracks or blisters. It has been found that the best checking results are obtained with the aid of a source of monochromatic light which reveals inaccuracies in the coating with remarkable clearness. The action of monochromatic light can be enhanced by employing coloring matter having a particularly good covering power within the spectral region of the source of monochromatic light.

Aniline colors are especially suited as additions to the coating varnish, and crystal violet, brilliant green, brilliant fiery red and nigrosin, all products of the I. G. Farbenindustrie, have for instance given satisfactory results.

The possibility of ascertaining defects in the dielectric with the aid of the process described before the dielectric materials are metallized involves considerable cheapening and simplification of the production of condensers or similar electrical apparatus made from such materials. The amount of waste resulting from a poor dielectric in the manufacture of condensers can be much reduced by the application of the process according to the invention.

HERMANN STRÄB.
WALTER DORN.

Published May 11, 1943

Serial No. 355,709

ALIEN PROPERTY CUSTODIAN

VALVES FOR ELECTRIC STORAGE BATTERIES

Friedrich Schneider, Hagen, Germany; vested in the Alien Property Custodian

Application filed September 7, 1940

My invention relates to improvements in valves for electric storage batteries, particularly alkaline storage batteries, and more particularly in valves of the type which are based on the use of a plate having minute pores and a layer of mercury placed thereon. As is known in the art, plates of sufficiently fine porosity, such for example as glass frits in which the pores have a width of from 5 to 15μ, can be used as mercury check valves with pressures of about 1,5 atmospheres. However, heretofore the use of such valves in electric storage batteries was not possible, because the mercury is affected by vapors containing oxygen of sulphuric acid, and because the glass frits which heretofore were universely used in such valves were not sufficiently stable as against the strong lye of alkaline storage batteries. Further, frits now in use are readily wetted by sulphuric acid as well as by potash lye, whereby the gas pressure at which the wetted frits permit the passage of the gas is increased to a multiple of that of dry frits so that an objectionable gas pressure can be developed in the cells.

The object of the improvements is to provide a valve in which the above-named objections are obviated, and with this object in view my invention consists in providing a valve for electric storage batteries and more particularly for alkaline storage batteries, in which the plates of fine porosity consist of a frit of a substance, preferably artificial resin, which has humidity repelling property, and which therefore is not wetted, the said frits being preferably made from polystyrol and polymetacrylic acid ester. Further, a body of fine porosity may be made from a material which is capable of being wetted or of being affected by the vapors, in which however the surface and the walls of the pores have a coating of humidity repellent and stable material.

For the purpose of explaining the invention several examples embodying the same have been shown in the accompanying drawing, in which the same letters of reference have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1 is a sectional elevation of the valve,

Fig. 2 is a sectional elevation illustrating a modification, the figure showing the valve as mounted on a cell, and

Figs. 3 and 4 are sectional elevations of the valve shown in Fig. 2 and illustrating the cell and valve in tilted positions.

In Fig. 1 I have illustrated a valve which is suitable for use in normal alkali cells, the object of the valve being to prevent the access of obnoxious carbonic acid to the cells.

As shown in the said figure the valve comprises a tubular bady s having an externally screw-threaded portion a of smaller diameter and a portion b of larger diameter. Internally the body s comprises three chambers c, d and e of different diameters whereby shoulders f and g are formed. Within the chamber d and on the shoulder f there is a porous plate p which provides a support for a layer q of mercury. The porous plate consists of the materials referred to above, that is either a frit of high porosity of a material which has humidity repelling property, and which is not affected by the vapors rising from the cell, or of a material which may or may not be humidity repellent or proof against the action of the said vapors, in which however the surface and the walls of the pores have a coating of humidity repellent and stable material. Preferred substances are the aforesaid substances artificial resin such as polystyrol and polymetacrylic acid ester. Above the layer q of mercury an annular body e formed with a partition h having a vent o_1 is fitted within the chamber e, and the said annular body is covered by a cap i having a vent o_2.

In Figs. 2 to 4 I have shown a modification of the valve which may be used in any upright or tilted positions of the cell. The valve body s has been shown fixed to a cell k. Its construction is substantially the same as that of the body shown in Fig. 1 and the same letters of reference have been used to indicate corresponding parts. The body of mercury q_1 is confined, between a lower plate p_1 mounted on the shoulder f, and an upper plate p_2 of similar material and of high porosity the plate p_2 being slightly spaced from the body q_1 of mercury. The valve body is closed by a screw cap i_1 having a vent o. By thus providing the cap i_1 which may be readily removed, access can be had to the plates p_1 and p_2 and the body of mercury q_1 for cleaning the plates or replacing the same by new plates.

Fig. 3 shows the cell turned sidewise into horizontal position. The volume of the body q_1 of mercury is such that a slight passage is left above the body of mercury and through the portions of the plates p_1 and p_2 located above the same. In Fig. 4 I have shown the cell in a position turned upside down, in which position the plate p_1 prevents the liquid electrolyte from leaking from the cell.

FRIEDRICH SCHNEIDER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. SCHNEIDER

VALVES FOR ELECTRIC STORAGE BATTERIES

Filed Sept. 7, 1940

Serial No.

355,709

Fig. 1

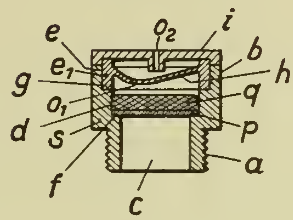


Fig. 2

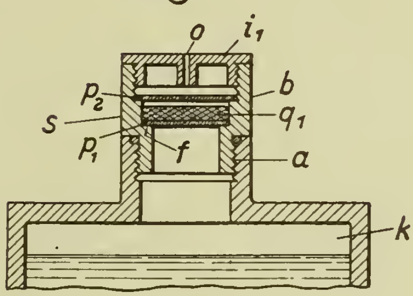


Fig. 3

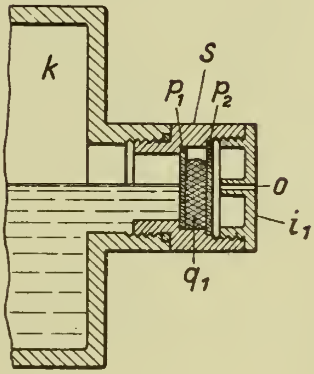
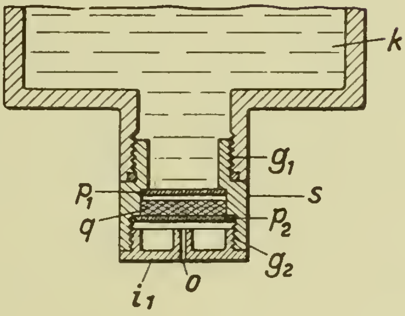


Fig. 4



Inventor:

Friedrich Schneider

by Franz Reichardt

Attorney

Published May 11, 1943 Serial No. 356,558

ALIEN PROPERTY CUSTODIAN

METHOD OF PREPARING STABLE DRY VITAMIN C

Ryo Yamamoto and Takeshi Hara, Taiwan, Japan; vested in the Alien Property Custodian

No Drawing. Application filed September 12, 1940

This invention relates to a method of preparing stable dry vitamin C, which consists in adding cow's milk to concentrated solution of vitamin C or to fruit juice rich in vitamin C, spraying the mixture into air or an atmosphere of carbonic acid gas and then drying the same into powder form. The object thereof is to obtain vitamin C in dry and powder form which stands preservation and is free from an apprehension of changing its quality and losing its effect, by enveloping it with the constituents of the cow's milk such as fat, protein, etc. and thus preventing its contact with air and moisture.

Vitamin C not only in the state of an aqueous solution, but also even in dry and powder form, gradually has its quality changed by contact with air or the moisture contained therein and has its effect reduced. According to the present invention, after adding cow's milk, concentrated solution of vitamin C or fruit juice rich in vitamin C is sprayed into the air or into an atmosphere of carbonic acid gas dried by heating and is turned into the powder form enveloped by the fat, protein, etc. contained in the milk, thereby cutting off the contact of vitamin C, with air or the moisture contained therein and making it a stable nutriment which well stands preservation.

The following is an examples of carrying out this invention into practice:

Example I

By adding magnesium oxide and calcium hydroxide, vitamin C-containing solution is alkalified and vitamin C is precipitated. Then, the solution is filtered and the precipitate is suspended and dispersed in water or alcohol. Next, by passing carbonic acid gas through it in slightly acidic condition, magnesium and calcium are precipitated as carbonate and at the same time vitamin C is liberated and then the solution is filtered again. Next, after adding 1,000 cc of cow's milk to 50 cc of the concentrated solution containing 0.5 gram of vitamin C which has been obtained by concentrating the filtrate by evaporation under reduced pressure, it is sprayed into a dry chamber held at 60° C., thus dispersing it as fine sprays and drying it.

In this way, 100 grams of the powder containing more than 0.3 gram of vitamin C is produced.

Example II

To 300 c. c. of concentrated and deacidified pineapple juice (the pineapple juice generally contains 0.4 gram of vitamin C per 1,000 cc.) is added 400 cc of cow's milk and the mixture is sprayed into a dry chamber held at 65° C., thus dispersing it as fine sprays and drying it.

In this way, 100 grams of the powder containing more than 0.3 gram of vitamin C is produced.

RYO YAMAMOTO.
TAKESHI HARA.

Published May 11, 1943 Serial No. 356,559

ALIEN PROPERTY CUSTODIAN

METHOD OF EXTRACTING VITAMIN C

Ryo Yamamoto and Takeshi Hara, Taiwan, Japan; vested in the Alien Property Custodian

No Drawing. Application filed September 12, 1940

The present invention relates to a method of extracting vitamin C, characterised by adding magnesium, or calcium or a mixture of magnesium and calcium in oxide or hydroxide form to a solution containing vitamin C, converting vitamin C in the alkaline state of the solution into a compound insoluble in water and alcohol, then suspending the compound in water or alcohol and treating the same with an acid which forms insoluble salts with magnesium or calcium, thus precipitating it and at the same time liberating vitamin C into the solution and finally concentrating it. The object thereof is to extract vitamin C very simply with a small loss and without the fear of retaining a substance bad for health.

It is known to separate vitamin C by treatment with lead salt solution. However, vitamin C is not merely lost by decomposition, but also as the vitamin C solution produced is apt to retain lead salt, there is a fear of its being injurious to health. Now, according to this invention, by adding magnesium or calcium or a mixture of magnesium and calcium in oxide or hydroxide form to a solution containing vitamin C, they are combined with vitamin C in alkaline condition and the compound thus obtained which is insoluble in water and alcohol is filtered and washed with water. Next, the vitamin C containing precipitate is suspended in water and acidified by an acid which forms insoluble salts with magnesium or calcium, for instance, carbonic acid, oxalic acid and phosphoric acid, so that it is made insoluble in water and at the same time vitamin C is liberated into the solution and is filtered. Then, by concentrating the filtrate under vacuum, concentrated vitamin C solution is produced simply with a good yield. In liberating the vitamin from vitamin C containing compound, if carbonic acid is employed, carbonate of magnesium or calcium remains in a slight quantity in the vitamin solution, which however is harmless unlike lead salt, whereas when oxalic acid is used, it is advisable to acidify the solution again with acetic acid and convert the remaining oxalic acid into calcium oxalate by adding lime and thus remove oxalic acid completely. The concentrated vitamin C solution thus obtained is used as such for medical or alimental purposes or made into milk powder containing much vitamin C, by mixing it with concentrated milk and drying it or is mixed with condensed milk to increase the quantity of vitamin C contained therein.

The following are examples of carrying out this invention into practice:

Example I

To 1,000 c. c. of the pine apple juice (the pine apple juice generally contains about 0.4 gram of vitamin C per 1,000 c. c.) concentrated to contain 1 milligram of vitamin C per c. c., is added calcium carbonate, and after deacidifying and filtering the mixture, the filtrate is rendered alkaline by adding 10 grams of magnesium oxide and 5 grams of calcium oxide successively. After combining them with vitamin C sufficiently, the insoluble vitamin C compound is filtered and the precipitate is washed with water. Then, suspending and dispersing the precipitate in water, it is acidified by the addition of oxalic acid to have the hydrogen ion concentration below pH4. After passing carbonic acid gas through it, liberated vitamin C is filtered and acetic acid is added to the filtrate. Next, after removing the remaining small quantity of oxalic acid completely by adding milk of lime and filtering the above, the filtrate is evaporated under vacuum. In this way, it is possible to obtain a concentrated solution containing more than 0.5 gram of vitamin C per 50 c. c. of the concentrated solution.

Example II

After rendering 1,000 c. c. of the juice of the fruit of passion flower (contains 0.3 gram of vitamin C per 1,000 c. c. weak acidic and adding 30 grams of magnesium oxide to it to be combined with vitamin C sufficiently, the insoluble compound is separated by filtration and washed with water, and after suspending and dispersing in the water, it is decomposed by carbonic acid gas in the presence of phosphoric acid and filtered. Then, by concentrating the filtrate under vacuum, there is obtained a concentrated solution containing more than 0.2 gram of vitamin C per 30 c. c. of the concentrated solution.

RYO YAMAMOTO.
TAKESHI HARA.

Published May 11, 1943

Serial No. 356,560

ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING DRY POWDERED SUGAR

Takeshi Hara, Taiwan, Japan; vested in the Alien Property Custodian

No Drawing. Application filed September 12, 1940

The present invention relates to a method of manufacturing dry powdered sugar, which consists in atomising the clarified and concentrated juice obtained by compressing the sugar-cane or sugar solution in the form of fine sprays with or without the addition of a suitable nutriment, food of taste, etc. into a tightly closed dry chamber containing the minute solid particles of sugar scattered at the starting of the operation, and thus drying and solidifying them on the said particles of solid phase. The object thereof is to obtain the less-hygroscopic solid powdered sugar easily from sugar solution containing relatively large quantities of molasses and other non-crystallizable substances.

If sugar is separated as crystals by evaporating and concentrating the juice obtained by compressing the sugar-cane and other sugar solution containing a relatively large quantity of molasses, the molasses attaches on the surfaces of the crystals and consequently the product is so hygroscopic and deliquescent that it is difficult to produce the powdered sugar that stands preservation. Such inclination is especially remarkable when the sugar is mixed with alimetally and flavorously-effective substances which as a whole are hard to crystallise. Also, if it is applied to the spraying and drying process to be dried in powder form by atomising it as fine sprays in a heated tightly closed chamber, the atomised fine sprays present an oversaturated condition and fall down as such and are accumulated so that they cannot be dried in fine powder form. Now, according to this invention, sugar-cane juice, or sugar solution is atomised in the form of fine sprays with or without the addition of one or more kinds of suitable nutriments or food of taste, for example, the aromatic and flavorous substances contained in a special kind of sugar only, such as vitamins, enzyme, salts and Jananese white sugar, in the air or inert gas in a tightly-closed dry chamber containing a small quantity of fine sugar particles scattered beforehand at the starting of the operation so that said fine sugar particles already present in the chamber may act as the nuclei of crystals to destroy the oversaturated condition of the surfaces of the fine sprays of liquid phase and breed numerous crystals. The thus-produced minute crystal particles are agglomerated into small masses as the molasses and other non-crystallizable substances contained in the fine sprays remain attached on said particles. They are thus made into the coarse particles which envelope the non-crystallizable substances. The dry powder accumulated on the floor in this way is carried out of the chamber. Thus, it is possible to form easily the less hygroscopic powdered sugar of great nutritive value and good taste fit as the material for canned food, condensed milk, powdered milk, confectionery etc. When the regular spraying and drying operation is reached, the masses of sugar particles formed by spraying are knocked against one another and destroyed, as the result of which the sugar crystals on their surfaces are partly pulverized into the finer powder particles and scattered and suspended in the drying chamber. Said particles being thus naturally utilized as the nuclei of crystals, the operation may be carried out continuously without the necessity of any further supply of the minute sugar particles to the chamber as the nuclei of crystals.

The following are the examples of carrying out this invention into practice:

Example I

The juice from a crude cane-sugar factory or a factory for manufacturing white sugar directly from the cane juice is concentrated to brix 40–70° and atomised in the form of fine spray with the addition of vitamin B complex compound and vitamin C by dry carbonic acid gas into a dry chamber held at 50–60° C., at the same time supplying and scattering fine sugar particles from below. Then, the sugar solution suspending in the hot atmosphere in the chamber is turned into dry powder by evaporation and accumulated on the floor, after which it is carried out and collected.

Example 2

If in the above example the sugar solution concentrated to brix 40–65° is added to the clarified cane sugar juice obtained by compressing the top of sugar cane, it is possible to obtain dry powdered sugar of peculiar sweet flavor containing vitamin B complex compound.

TAKESHI HARA.

Published May 11, 1943

Serial No. 356,564

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE MANUFACTURE OF A LINOLEUM-LIKE PRODUCT BY EMPLOYING SUBSTANCES EXTRACTED FROM TOMATO SKINS

Guido De Blasio, Narni, and Giovanni Mauri, Parma, Italy; vested in the Alien Property Custodian

No Drawing. Application filed September 12, 1940

Processes whereby gummy or plastic substances may be obtained by treatment of tomato skins are already known. The extraction may be carried out e. g. by treatment of the skins with caustic alkalies in order to saponify the substances contained in the skins. The alkaline solutions thus obtained are decomposed by treatment with acids and the precipitated substances are then washed and eventually condensed or further treated.

We have now found that by starting from the last mentioned substances and subjecting them to further treatments e. g. polymerization in the presence of colophony and/or the like, it is possible to obtain a cohesive substance which may replace the usual linoleum cement, obtained from linoxyn, thus preparing a linoleum-like product.

The polymerization treatment object of the present invention consists in the fact that e. g. the gummous substances are brought to a convenient temperature in the presence of colophony and/or the like resins whereby polymerization is effected in such a way as to obtain a tough, elastic, cohesive substance resembling ordinary linoleum obtained from linoxyn.

The proportion between the substances obtained by extraction from tomato skins and colophony and/or other like resins may vary in the same way as in the ordinary linoleum composition. It is obvious that the above description is only by way of example and not exclusive.

With the cohesive substance thus prepared, a mixture similar to those employed in the ordinary linoleum manufacture may be obtained which may then be calendered and pressed upon a backing, thus obtaining a product similar to linoleum and showing the same characteristics in so far as its practical applications are concerned.

In order to better understand the present invention the following example is given:

70 parts of substances extracted from tomato skins as above described are mixed with 30 parts of colophony, the polymerisation being subsequentlly carried out at a convenient temperature thus obtaining a cement which may substitute the ordinary linoleum cement.

Subsequently,

	Parts
Cement thus obtained	300
Cork flour	350
Ochre and colouring	160

matters are worked together in the mixers usually employed in the linoleum industry; the mixture thus obtained is calendered and pressed upon a backing. In this way a product similar to linoleum is obtained having the same characterisitcs in respect of practical applications.

Instead of totally employing the cement prepared as above disclosed starting from substances extracted from tomato skins, it may be employed only partially together with the ordinary cement obtained from a mixture of linoxyn and resins.

The proportion of the two cements may practically be whatever, anyhow the more convenient amount is of about 50% for each type of cement.

Example

	Parts
Cement obtained by using the cohesive agent extracted from tomato skins	150
Ordinary cement obtained by using linoxyn	150
Cork flour	300
Ochre or colouring matters	160

are worked together in the mixers usually employed in the linoleum industry and the mixture thus obtained is calendered or pressed upon a backing.

As an alternative to the process for extracting gum-resin substances from skins as above disclosed after alkaline treatment in a vessel, instead of separating from the exhausted skins, by filtration or decantation, the liquid portion and continuing the subsequent operations only on the liquid portion, the acid treatment is applied on the whole mass so that also the insoluble portion of the skin will precipitate together with the resinous substances.

The mixed precipitate thus obtained is then subjected to the above mentioned subsequent polymerisation treatments and then is employed for the manufacture of linoleum.

The portion of the exhausted skins insoluble in the alkaline solution, represents about 20% of the dry skins treated and mainly consist of cellulose and lignin containing also, in a smaller proportion, polysaccarides and nitrogen containing substances i. e. its composition is similar to that of wood and may thus conveniently be used as a filler, either as it is or after being separated and subsequently treated in any suitable way.

Example

	Parts
Mixed precipitate containing besides the resinous substances also skins residue in the proportion of 20%	84

and

Colophony are polymerised in the same manner as above disclosed thus obtaining the desired cement	30

Subsequently,

	Parts
Cement thus obtained	342
Cork flour	340
Ochre and colouring matters	130

are worked together as described in the previous examples thus obtaining a product similar to linoleum which is like to the one obtained according to the two above mentioned examples.

GUIDO DE BLASIO.
GIOVANNI MAURI.

Published May 11, 1943

Serial No. 356,697

ALIEN PROPERTY CUSTODIAN

CIRCULATING PUMP FOR PASTY MASSES ESPECIALLY FOR CONCRETE

Fritz Hell, Kiel, Germany; vested in the Alien Property Custodian

Application filed September 13, 1940

The invention relates to a circulating pump for pasty masses, especially concrete. It has for its object to provide a construction which is simple and reliable in service and not endangered even by the stones contained in the concrete. The invention starts from a cylindrical casing with cylindrical piston rotating therein and with slide plates adapted to be oscillated out of the piston and serving as conveying means. The invention consists in that, the piston being centrically arranged in the casing, the slide plates uniformly distributed around the piston are gripped from both sides by cylindrical discs which are mounted in the extensions of the piston closing the pump space from the sides and extending up to the casing.

The arrangement is further made, in order to carry through a drive of the slide plates, that the cylindrical discs which engage on the slide plates carry outwardly projecting pins fixed on the side walls of the piston. On at least one of these pins a control lever for the slide plates may be mounted.

It has proved to be suitable to provide a two-armed control lever, one arm of which carries a roller destined to roll on a guide rail, and to the other arm of which a pull spring fixed on the piston is attached so that the slide is moved in the opening direction by the co-operation of roller and guide rail, and in the closing direction by the spring. This arrangement prevents that the slide plates or their control elements are damaged or must be made extra strong owing to the stones which may be stuck between the side plate and the casing wall of the pump.

The slide plate has preferably the shape of a plate extending over the passage cross section of the pump and curved and mounted in the piston so that in the opening position it fits snugly in the outer circumference of the piston. The plate is journalled in the piston preferably by lateral discs made in one piece and connected with it.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which

Figs. 1 and 2 are sections through the circulating pump according to the invention,

Fig. 3 is a front elevation of the piston pump.

The stationary pump casing is designated by 1 and the piston rotating in the direction of the arrow 3 is designated by 2. The piston 2 is keyed on the driving shaft 4 journalled in lateral bearings 5.

The rotary slides are mounted in the piston which herefore has indentations 6. The rotary slides consist of slide plates 7 extending over the passage cross section of the pump and carrying at their ends discs 8 from which pins 9 extend which are journalled in brackets 10 fixed on the piston. The outer side 11 of the rotatable discs 7 are curved so that they fit flush into the circumference of the piston 2 when the slide is in the open position shown in the lower portion of Fig. 1.

Two-armed levers 12 are fixed on one side of the pump on the journalled pins 9 of the rotary slides and carry a roller 13 on the outer arm, whereas a pull spring 14 is hooked onto the end of the other arm, the other end of the spring being fixed on the piston at 15. The rollers 13 run on a guide rail 16 fixed on the outer side of the stationary pump casing by screws 17.

The operation of the pump is as follows:

The material is fed to the pump by a funnel 18 and drops into the conveying channel 19 of the pump which is bordered by the stationary pump casing and by the piston 2. The material is then displaced by a rotary slide rotating with the piston when the plate 7 is in the transverse position relative to the outlet 20 as shown in Fig. 1 at least up to the moment when the plate 7 of the next following rotary slide has shut off the connection of the space behind the plate of the rotary slide in front of it with the admission point 18. The slide is then opened by the co-operation of the two-armed lever 12 with the roller 13 and the control rail 16, and the plate 17 arrives finally in the extreme opening position shown in the bottom portion of Fig. 2, in which the passage to the outlet 20 is free. If the slide, i. e. the plate 7, has passed along the stripper 21 fixed on the casing wall, it is returned into its closing position by the action of the spring 14 according to the construction of the control rail, and the operation begins afresh.

The invention is evidently not restricted to the embodiment illustrated, as this may be constructively modified within the range of the invention; for instance more than two rotary slides may be mounted in the piston and special devices may be provided at the different points for a perfect packing of the conveying channel against the outer side, for instance on the side discs 8.

FRITZ HELL.

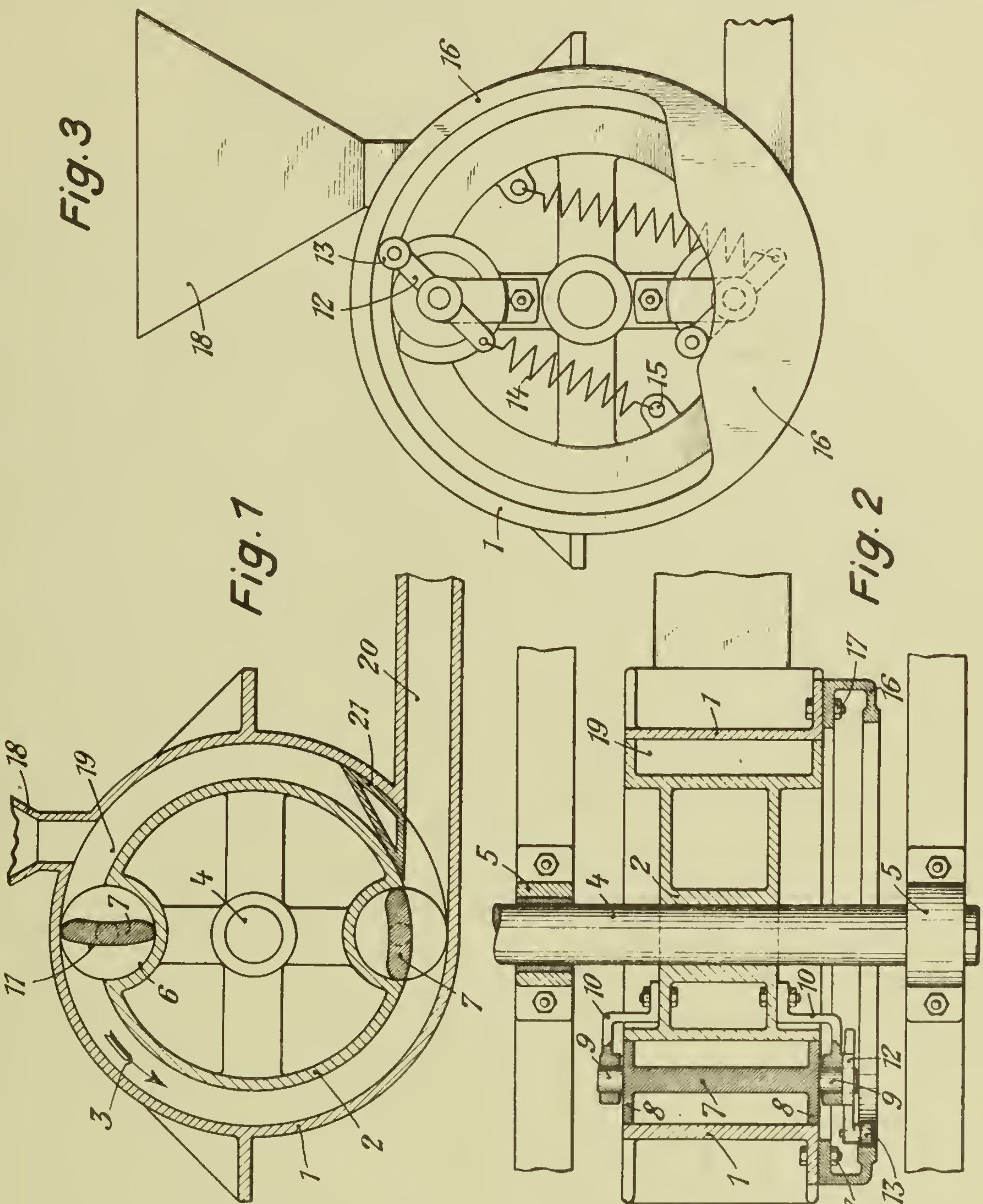
PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. HELL
CIRCULATING PUMP FOR PASTY MASSES
ESPECIALLY FOR CONCRETE
Filed Sept. 13, 1940

Serial No.
356,697



Inventor:
Fritz Hell
By
Young, Emery & Thompson
Attorneys

Published May 11, 1943 Serial No. 357,688

ALIEN PROPERTY CUSTODIAN

REFRIGERATING APPARATUS OF THE COMPRESSION TYPE

Rudolf Hintze, Berlin-Charlottenburg, and Anton Engelmann, Berlin-Tegel, Germany; vested in the Alien Property Custodian

Application filed September 21, 1940

The present invention relates to improvements in refrigerating apparatus of the compression type.

It is well known in the art to control in such refrigerating apparatus the quantity of refrigerant flowing from the condenser to the evaporator by means of a float-controlled valve. Such a valve is, as a rule, arranged in a separate tank. The constructions hitherto known of the above type require a relatively large amount of material, since a comparatively large reserve of energy must be available in order to attain a reliable operation so as to overcome with certainty a jamming which may occur within the float lever system. According to the invention it is possible to reduce considerably the amount of material required for the float valve without impairing the reliability of operation thereof. This may be accomplished according to the invention by securing the float body to a rocking lever rotatably mounted in a stationary carrier and to which is also secured the valve needle, the ratio of transmission amounting, for instance, to 1:10 and over. By choosing such a great ratio of transmission it is possible to employ a very small float for operating the valve. Further features essential to the construction of a float-operated valve will be hereinafter explained in connection with the description of the embodiments shown.

An embodiment of the float-operated valve according to the invention is shown in Figs. 1 to 3. The float tank consists of two parts **31** and **32** firmly secured around their edges by welding. From the condenser (not shown) extends a conduit **33** into the interior of the tank. Through this conduit the liquid refrigerant passes into the float tank. **34** denotes the refrigerant conduit extending from the float tank to the evaporator (not shown), one end of the conduit being fitted in the body **35**, in which is arranged also the valve needle **38**.

The refrigerant flows through the passages **36** and **37** of the body **35** and then through the conduit **34** to the evaporator when the valve is in the open position. The valve needle **38** is secured to a rocking lever **40** by means of a pin **39**. The rocking lever **40** is in turn rotatably mounted in the manner as shown in the drawing in a carrier **47** with the aid of a bent wire **46**, the upper end of the carrier **47** being secured to the body **35**. The rocking lever **40** carries at one end a counter-weight **41** and on the other the ball float **44** made of two halves. The ball float is provided with two depressions **42** and **43** cooperating with corresponding parts of the rocking lever **40**. The ball is therefore not firmly secured to the rocking lever itself by welding; screws or the like. The two arms of the rocking lever **40** are welded together as indicated at **51**. The upper half **31** of the float tank is raised at the side facing the ball **44** in order that the float may move in the upward and downward direction. On the off-set wall of the upper part of the tank an electromagnet **20** may be mounted which serves to open the valve at will. The iron body of this electromagnet **48**, **49**, **50** has a U-shaped form in order that the two limbs **49** and **50** extend exteriorly of the float tank. As soon as the exciting current, which flows through the coil **20** has exceeded a predetermined value, the ball float **44** is attracted in the upward direction, thereby removing the valve needle **38** from its seat. Owing to the great ratio of transmission $a:b$, the dimensions of the arrangement, particularly the size of the ball float may be considerably reduced as compared to the arrangement hitherto known, without affecting the forces necessary for opening and closing the valve. **45** denotes a sieve which prevents foreign substances from passing from the tank into the valve.

Another embodiment of the float-operated valve which is very simple in design is shown in Figs. 4 to 6, in which similar numerals of reference denote corresponding parts as in Figs. 1 to 3. The valve ball consists in this embodiment of two halves **61** and **62**.

The rocking lever **63** is designed in the form of a simple wire which extends through the ball in the manner as shown in Fig. 4 and which is welded to the ball half **61** as indicated at **66**. The lever **63** is firmly secured to the strap **64** by welding which is rotatably mounted in the carrier **47** by means of a pin **65**.

RUDOLF HINTZE.
ANTON ENGELMANN.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. HINTZE ET AL
REFRIGERATING APPARATUS OF THE
COMPRESSION TYPE
Filed Sept. 21, 1940

Serial No.
357,688

2 Sheets-Sheet 1

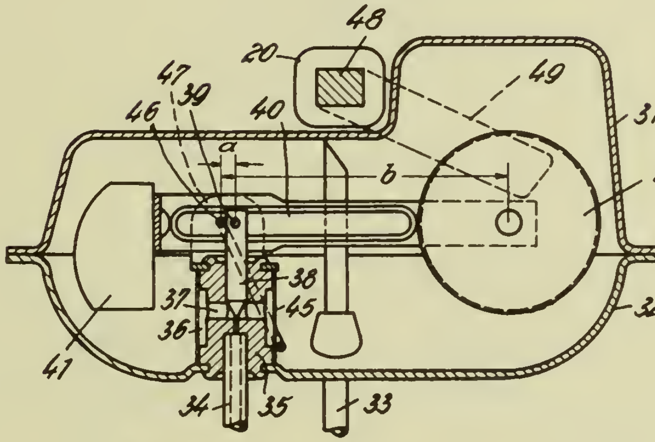


Fig. 1

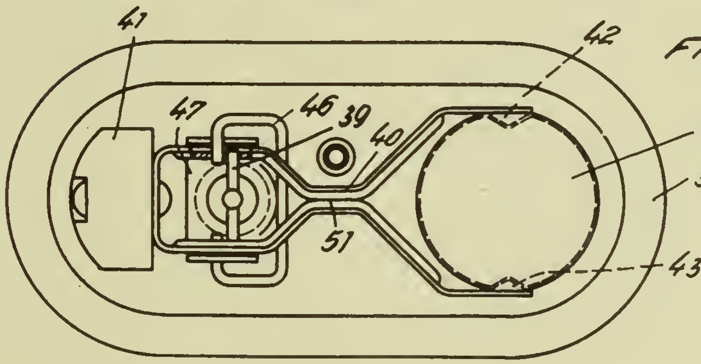


Fig. 2

Inventors
Rudolf Hintze and
Anton Engelmann
by Knight Bros
Attorneys

PUBLISHED

MAY 11, 1943.

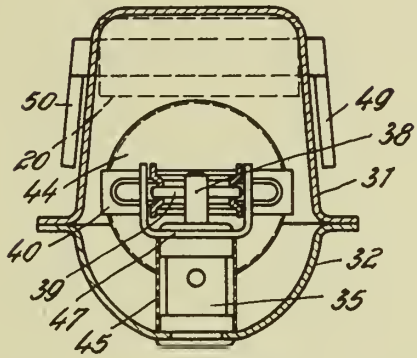
BY A. P. C.

R. HINTZE ET AL
REFRIGERATING APPARATUS OF THE
COMPRESSION TYPE
Filed Sept. 21, 1940

Serial No.
357,688

2 Sheets-Sheet 2

Fig. 3



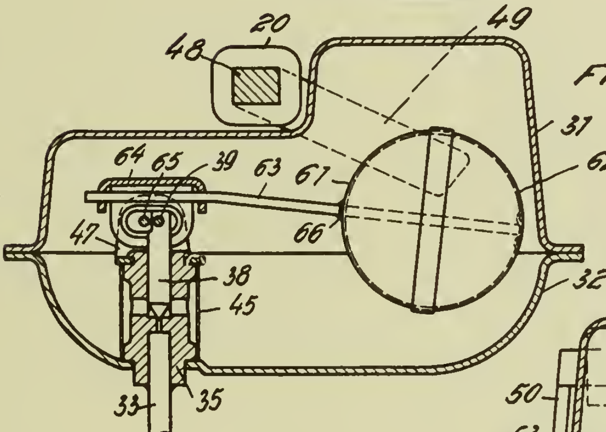


Fig. 4

Fig. 6

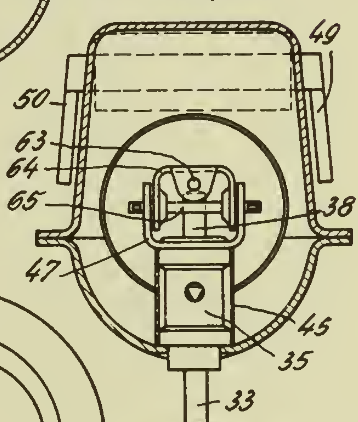
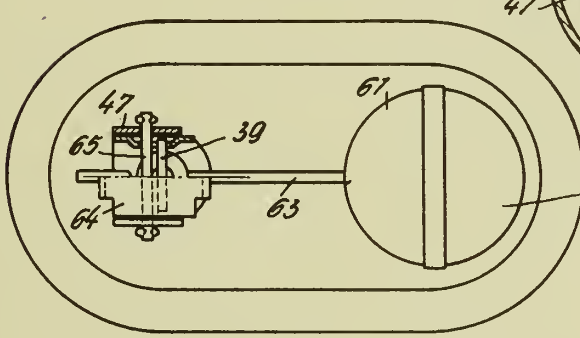


Fig. 5



Inventors
Rudolf Hintze and
Anton Engelmann
by Knight Bros
Attorneys

Published May 11, 1943 Serial No. 358,039

ALIEN PROPERTY CUSTODIAN

CARD FILING COMPARTMENTS

Nicolaus Per Mathiesen, Drammen, Norway; vested in the Alien Property Custodian

Application filed September 23, 1940

The present invention relates to arrangements for the display of the individual cards in the pack of cards filed in filing trays, containers and the like, and the main idea of the invention is the use of magnetic forces for the separation of the individual cards for the display. For this purpose the individual cards are controlled by elements of magnetically conducting material which under the influence of magnetic forces are caused to assume a spread position, thereby effecting the desired spreading of the cards. The arrangement preferably is such that the magnetic lines of force extend in the same direction through succeeding elements, and if an opening at the top of the pack of cards is provided at any desired point, for instance by a manual or mechanical separation, or by magnetic influence upon the elements, the magnetic repulsion between the elements will effect the spreading of the elements and thereby of the cards at this point, so as to make at least the top of the cards visible, whereby the desired card is easily found.

In order to avoid the complication and liability to errors always present in electrical connections, the magnetic field may be produced by means of permanent magnets, magnetical material being now obtainable, having sufficiently high permanent magnetism and stability for the present purpose.

The elements controlling the movement of the cards may consist of thin iron tapes or the like and may be used as separating elements between the individual cards, or be connected to the cards proper.

In view of the above, it is possible to use separating iron sheets of permanent magnetic material, which themselves provide for the required magnetic force. But as the alloys which could then be used, are too brittle to have the required mechanical strength when the sheets are made so thin as is desirable out of consideration to the space available, and an excessive quantity of permanent magnetic material would be required, it is desirable to have the elements influenced by an external magnetic field. In this case the field may in itself effect a control upon the elements in addition to the control effected by the repulsion of the elements between one another, a mechanical separation between the elements and the magnets being provided so as to prevent any contact or magnetic sticking between the elements and the magnets. The pole pieces of the magnets may for instance be mounted outside of the side wall of the card carrying tray which should then be made of a material which is magnetically neutral, and the elements may then be arranged along the side edges of the cards and each magnet be arranged with its pole pieces one above the other. Thereby a symmetrical force is obtained, a pull of the cards in one direction thereby being avoided. Preferably the magnets are arranged on both sides of the pack of cards, pole pieces of the same polarity being arranged in the same level so as to avoid stray losses by lines of force running from one side of the tray to the other for instance through the floor of the same.

When an external magnetic field is used, it is desirable to arrange the elements on the cards themselves, it being thereby possible to make the elements very thin, below $\frac{1}{10}$ m/m and with a breadth of a few m/m, the mechanical strength of the elements then being of no importance. In this case the elements should be made of a magnetic material practically without any remanence, in order to avoid their sticking to casual iron parts or to one another when removed from the tray. Such a card may be handled in the usual manner, the thin elements being so flexible and so thin that the card for instance without difficulty may be placed in a typewriter.

Preferably the elements are connected to the card by being glued into the same for instance along the side edges in such a manner that the elements are covered by the paper, cardboard or the like on both sides, whereby the card will look like an ordinary card.

When an external field is used, it is very suitable to make the pole pieces of the magnets in the form of rods extending along practically the full length of the pack of cards. The magnet field will then tend to keep the cards in an upright position out of which they may be brought at any desired point by external influence. The simplest way of obtaining this is to use the hand only, by sliding one finger along the pack of cards, whereby the cards are spread successively, or the pack of cards may be gripped with two fingers at two points at a small distance from one another, and drawn apart whereby the intermediary cards will spread out like a fan. When this is to be performed by drawer trays, the pole pieces of the magnets must be mounted on the tray itself so as to influence the elements in the withdrawn position of the tray.

In order to facilitate the formation of the fan, one or both end walls of the tray are suitably arranged at an angle to the floor of the tray, as known per se.

Such an arrangement usually is preferable as it is simple and in most cases gives quite sufficient

facilitation in searching the cards. But it is also possible to effect the spreading at the desired point without manual influence upon the cards. In this case a device must be used which is arranged movably relatively to the tray in the direction of length of the same and which causes variations in the magnetic condition of the elements. This device may for instance be mechanical so as to bring the elements out of position in an existing field, or magnetic so as to reduce or strengthen the field, or the field may contingently be produced by the device itself, the magnet being carried by the device. In the latter case the cards may beforehand be placed in an oblique position from which they are lifted by the magnets. The simplest way is, however, to make the device reduce an existing field by erecting a magnetic shunt connection across an external field produced by means of pole pieces extending along the whole length of the magnet, it being possible by suitable forming of the shunt connection to obtain a spreading of the cards at the point at which the device is placed.

In order to effect the desired relative movement between the device and the tray, the device may, when used in connection with drawer trays, be stationary relatively to the container or cabinet surrounding the tray, the movement being effected by the withdrawal or pushing in of the tray.

Preferably the device is so arranged that it works during the movement of the tray so as to make the cards spread successively. Thus, the magnets may be mounted in the compartment surrounding the tray so as to make the cards fall forward to an oblique position when the tray is withdrawn and rise when the tray is pushed in, or, if the magnets are mounted on the tray, the compartment may constitute a magnetic shunt so as to make the cards rise from an oblique position when the tray is withdrawn and fall down when the tray is pushed in. In the latter cases, where the elements normally are under the influence of the magnetic field when the cards are accessible, any method of searching may of course be used, i. e. the cards may be spread either by gripping the cards directly or by effecting the relative movement between the effecting device and the tray.

It is, however, possible to make the cards turn over automatically in the form of a fan without using any special device for the variation of the magnetic condition of the elements.

If, in an embodiment in which all elements are simultaneously subjected to the magnetic field, the field is not stronger than that the pack of cards may assume an oblique position, and if, by providing for a sufficient space or preferably by arranging one end wall at an angle to the floor of the tray, the pack of cards is caused to assume such oblique position, a fan will normally be formed at one end where the end wall may be vertical or be inclined at a greater angle than that of the other end wall.

If the pack of cards in this case is gripped at the end opposite to that where the fan is formed. or at any point along the length of the same, and the cards are raised. the fan, which is now formed at the point where the pack is gripped, will, when the grip is released, move along the pack of cards in a wave to the end where it was initially formed until all cards are in their initial position.

In the accompanying drawing illustrating the invention, Fig. 1 is a front view of a card with the elements according to the invention incorporated in the card. Fig. 2 is a perspectiviic view of one side of a pack of cards, showing an embodiment wherein a source of the magnetic field is in the form of a horse shoe magnet. Fig. 3 is a vertical section through a card tray with a pack of cards inserted and with a special form of the magnet system arranged in a recess in the wall of the tray. Fig. 4 is a view of the magnet system along the line A—A in Fig. 3. Fig. 5 corresponds to Fig 2, but shows separate elements and how the elements are spread in the form of a fan under the influence of the magnetic forces.

Similar references are used for similar parts in all figures.

In Fig. 1, 1 is the card which may be of paper, card board or the like, for instance glued to the card or inserted in the card so that the elements are covered on both sides. As will be seen, the elements are arranged at a small distance from the edge of the card in order to avoid a magnetic sticking between the elements and the pole pieces of the magnet system.

In Fig. 2 a pack of cards 1 each having elements 2 at each edge of the same are shown, a horse shoe magnet 3 being arranged at the sides of the pack of cards in order to obtain the desired spreading of the cards. The magnet 3 is so formed that the north and south poles of the same extend essentially along the pack of cards at a certain distance from each other. Consequently the magnetic lines of force will extend from the south pole of the magnet through the air gap provided between the said poles of the magnet and the said side edges of the card longitudinally of the elements to the north pole of the magnet. In this manner all elements are similarly magnetized so that portions of the same lying adjacent to each other, will be subjected to repellent forces due to known magnetic laws.

In the Figures 3 and 4 the arrangement corresponds to that shown in Fig. 3 with the modification that the magnet 3 is provided with pole pieces 4, 5, the former being in the form of a rod extending longitudinally of the pack of cards, and the latter being in the form of a channel having the limbs of the same directed towards the pack of cards and also extending longitudinally of the pack of cards. As shown the magnet system is arranged on each side of the pack of cards in a recess in the side wall 6 of the card carrying tray.

In order to obtain a spreading of the cards at any desired point along the length of the pack of cards, a magnetic shunt piece 7 is slidingly mounted on the pole piece 4 first mentioned, a longitudinally extending handle or the like 8 being secured to the said shunt piece so as to enable a manually operated movement of the said shunt piece 7. Where the distances between the pole pieces 4 and 5 are bridged by means of the shunt piece 7, no or essentially no magnetic lines of force will extend through the elements 2, whereby the spreading of the cards is limited to the distance along the length of the pack of cards not covered by the said piece 7. By suitably adjusting the position of the said piece 7, the spreading movement of the cards may be consentrated at any desired point along the pack of cards.

The embodiment shown in Fig. 5 corresponds in all essentials to that shown in Fig. 2 with the difference only that the elements 2 instead of being incorporated in the cards 1 are formed as separating sheets to be inserted between the individual cards (not shown).

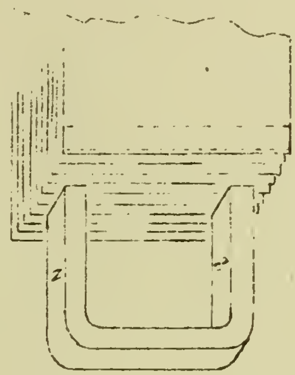
NICOLAUS PER MATHIESEN.

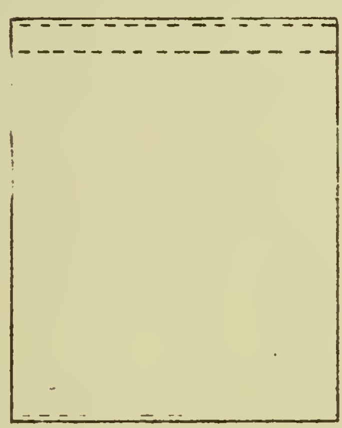
PUBLISHED
MAY 11, 1943.
BY A. P. C.

N. P. MATHIESEN
CARD FILING COMPARTMENTS
Filed Sept. 23, 1940

Serial No.
358,039
2 Sheets–Sheet 1

Cancelled Per A- May 23, 1941





Inventor

Nicolaus P. Mathiesen

Watson, Cole, Grindle & Watson

Attorneys

PUBLISHED

MAY 11, 1943.

BY A. P. C.

N. P. MATHIESEN

CARD FILING COMPARTMENTS

Filed Sept. 23, 1940

Serial No.

358,039

2 Sheets-Sheet 2

Fig. 3

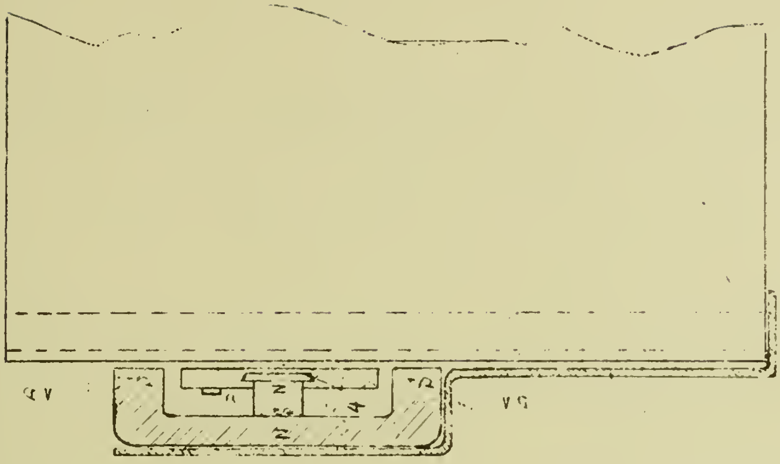


Fig. 4

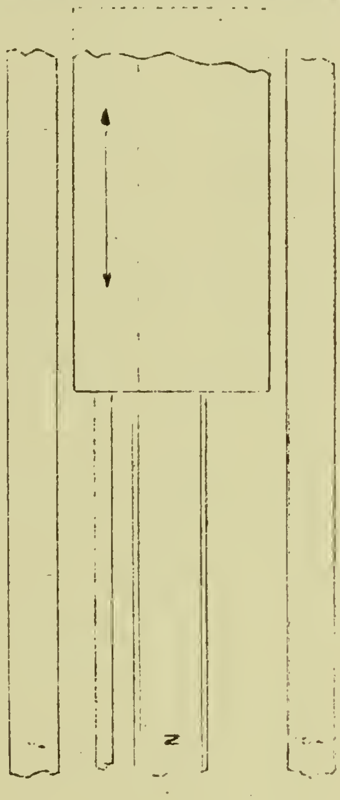
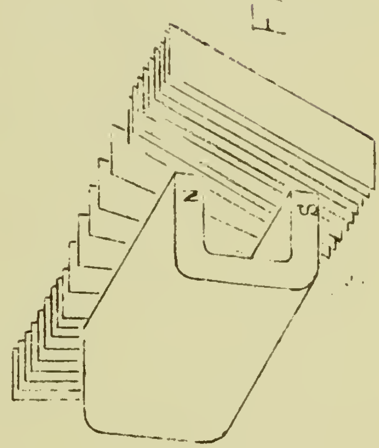


Fig. 5



Inventor

Nicolaus P. Mathiesen

By Watson, Cole, Grindle & Watson

Attorneys

Published May 11, 1943 Serial No. 358,067

ALIEN PROPERTY CUSTODIAN

SEALING COMPOUNDS

Felix Herriger, Berlin, Germany; vested in the Alien Property Custodian

Application filed September 24, 1940

This invention relates to sealing material, such as employed for sealing the joints of electric discharge vessels, for instance, in order to secure vacuum-tightness thereof. An example of such a discharge vessel is shown in the accompanying drawing which represents a sectional view of an electron tube. **1** denotes a bulb of high-melting metal, **2** a ceramic cover for this bulb, **3** an electrode system mounted on this cover by means of the leading-in wires, and **4** indicates a layer of glass. Layer **4** is arranged to cover both the body **2** and a flange formed integral with the bulb **1**, and thus seals the joint of the parts **1**, **2**. In the case represented by way of example the layer **4** is utilized also for sealing the leading-in wires into the cover **2**.

Layer **4** is in general made of a hard vitreous material which is difficult to soften and has a low coefficient of expansion, thus being able well to unite with high-melting metals. A further reason why hard glass seals may be highly heated resides in the fact that on account of their low heat expansion strains arising in them are less than in the case of soft glass which highly expands when heated.

Such hard glasses, however, are not suitable for glazing highly expanding material, as iron or alloyed steel, since the curves of their coefficients of expansion are too much different from those of the metal. The aim should be to employ glass of the kind having expansion curves which greatly accord with those of the metal. In discharge vessels with metal bulb and glass seal the temperature of this seal momentarily rises under the influence of pulsating loads. Such rise of temperature, however, will be quite ineffective if a sealing material, such as a glass-like substance or vitreous material, is employed the transformation temperature of which is so low that the heat expansions of all the materials so interconnected are small in the temperature range between the transformation temperature and the temperature of the surrounding air or so-called ambient or room temperature.

As regards the transformation temperature of the sealing material there is a lower limit depending upon the requirements of service. However, the transformation temperature should not be lower than the temperature which the sealing material may acquire during operation. This requirement is in the first place due to the vapor pressure which is negligible only at temperatures below the transformation temperature, being small enough in this case. In the second place such requirement takes the electric conductivity into account, which rises by jumps whenever the transformation temperature is surpassed. In the third place the said requirement is attributable to the viscosity which rapidly decreases at temperatures above the transformation temperature, whereby the seal may be pressed inward by the influence of the outer air.

Where it is desired to obtain a seal which is of a high load capacity and resistive to heat, and if it is not practicable to make use of hard glass, on account of the coefficient of expansion or the high melting temperature thereof, then resource may be had to seals as provided by the invention, these having a comparatively low transformation temperature and a particularly high elongation at rupture or breaking elongation.

Below the transformation temperature the elasticity of vitreous sealing material of the preferred kind obeys Hook's law. The greater the breaking elongation as compared with the thermal expansion the higher may be the thermal demand on such material. Since strains therein can only form until the transformation temperature is reached the maximum of the thermal expansion is $\delta_{th}=\alpha\Delta T$, where α is the coefficient of expansion while ΔT is the difference between transformation temperature and ambient or room temperature. For instance, an ambient temperature of 30°, a transformation temperature of 350° and a coefficient of expansion of $90\cdot10^{-7}$ will effect the thermal maximum expansion $v=2.88\cdot10^{-3}$. The breaking elongation δ_b depends on the tensile strength Z and the modulus of elasticity E of the sealing means and is

$$\delta_b=\frac{Z}{E}$$

According to the invention it is proposed that the breaking elongation be made as high as possible, being made to be at least half as great as the said maximum of the thermal expansion. Thus, in the case of the cited example the maximum breaking elongation should be about $1.5\cdot10^{-3}$. Such a high value of the breaking elongation may be obtained by an appropriate composition of the sealing material.

In this regard sealing material is suitable that has a low transformation temperature, a relatively high tensile strength and a low modulus of elasticity. A low transformation temperature is in well-known manner obtained by means of plumbic oxide and boric acid. The tensile strength is increased by calcium oxide and barium oxide.

Among prior compounds of this or a similar kind there is an enamel cement whose transformation temperature is about 350° and which is composed of 20% silica, 64% plumbic oxide and 16% borax. This cement, however, has a rather high coefficient of expansion and a low breaking elongation and hence is not always suitable for use as sealing material. In addition it contains borax, that is, does not contain boric acid alone but also sodium oxide, and experience shows that alkali added to glass causes this to be electrically conductive at certain high temperatures.

A suitable sealing compound consists of at least 65% plumbic oxide, at most 15% silica, at least 10% boric acid and at least 3% barium oxide or calcium oxide. Good results have been attained by means of a sealing compound composed as follows: 62% plumbic oxide, 15% silica, 11% boric acid and 5% barium oxide. The coefficient of expansion of this special compound is about $90 \cdot 10^{-7}$ and thus is similar to that of the chromium-iron alloys containing about 5% chromium.

Vitreous sealing compounds as provided by the invention have high coefficients of expansion and thereby render it possible that a non-magnetic iron-nickel alloy of about 28% nickel and 72% iron can be hermetically sealed with their aid. This has not been possible so far on account of the high coefficient of expansion of the iron-nickel alloy.

The novel sealing means may be employed for sealing together metal and metal, metal and ceramic material, ceramic material and ceramic material, or ceramic material and glass.

FELIX HERRIGER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

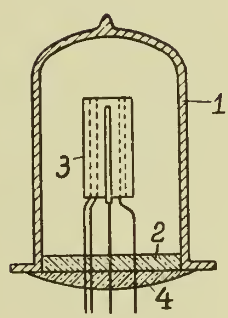
F. HERRIGER

SEALING COMPOUNDS

Filed Sept. 24, 1940

Serial No.

358,067



INVENTOR
FELIX HERRIGER

BY [signature]

ATTORNEY

Published May 11, 1943 Serial No. 358,109

ALIEN PROPERTY CUSTODIAN

TAPPET GUIDE, SPECIALLY FOR PLUNGER PUMPS

Heinz Links, Gaggenau/Baden, Germany; vested in the Alien Property Custodian

Application filed September 24, 1940

The invention relates to a tappet guide, specially for plunger pumps with several cylinders or similar aggregates and its object is a simplification of the tappet guiding, in order to make it less expensive, and to facilitate the replacement of the tappets in case of wear or inexact guiding of the tappets, simultaneously a small length of construction of the aggregate may be obtained, if the cylinders are arranged in series.

An essential feature of the invention consists in the fact that the tappets guide each other by themselves, having for instance a diameter which is greater than the distance of the middle axles of single tappets from each other, and being flattened for a mutual guiding at the faces turned towards each other.

Further advantages proceed from the following description.

In the enclosed drawings

Fig. 1 shows a vertical section through a fuel injection pump casing with built-in tappet,

Fig. 2 shows a plan view on the left hand half, the bores for the tappets being provided in the transverse bottom of the casing, while the right hand half shows the built-in tappets and plungers, according to line 2—2 of Fig. 1.

Fig. 3 shows a section through another embodiment of the invention.

The pump casing **1** has above the space **3**, containing the cam shaft **2**, a transverse bottom **4**. In this transverse bottom bores **5** for the tappets **6** of the plungers **7** are provided. The tappets **6** slide on the pertaining cams **8**, as shown in Fig. 1, by means of the rollers **9**. The fuel is sucked in from the suction space **11** and delivered into the injection pipe **12** through the pressure valve **13**. After the end of the effective delivery stroke the fuel escapes into the space **14**.

The bores in the transverse bottom **4** are arranged by means of a milling cutter corresponding to the maximum diameter of the tappets **6** in such a way in the axle direction of the cam shaft, one in back of the other, that they intersect each other. The dimesion x of this intersection is chosen in such a manner that sufficiently wide fitting planes are produced for a satisfactory guiding of the tappets. In consequence the fitting planes **10** of each two neighbouring tappets **6** touch each other, guaranteeing a satisfactory guiding without turning. The surfaces to be machined at the tappets are comparatively small. The manufacture of the cylindrical throughgoing bores **5** is very simple. At an excessive wear of single tappets, only the tappet in question should be replaced.

In a specially simple and inexpensive type the rollers **9** may also be omitted, so that the tappets **6** slide on the pertaining cam by means of a suitable, for instance roof-shaped bottom face **15**, as shown in Fig. 3.

HEINZ LINKS.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. LINKS
TAPPET GUIDE, SPECIALLY FOR PLUNGER PUMPS
Filed Sept. 24, 1940

Serial No.
358,109

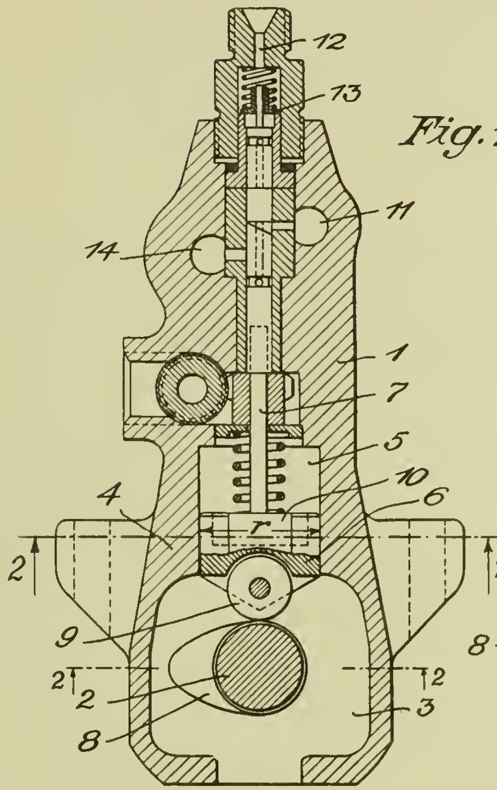


Fig. 1.

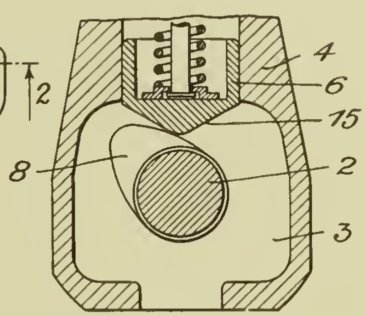


Fig. 3.

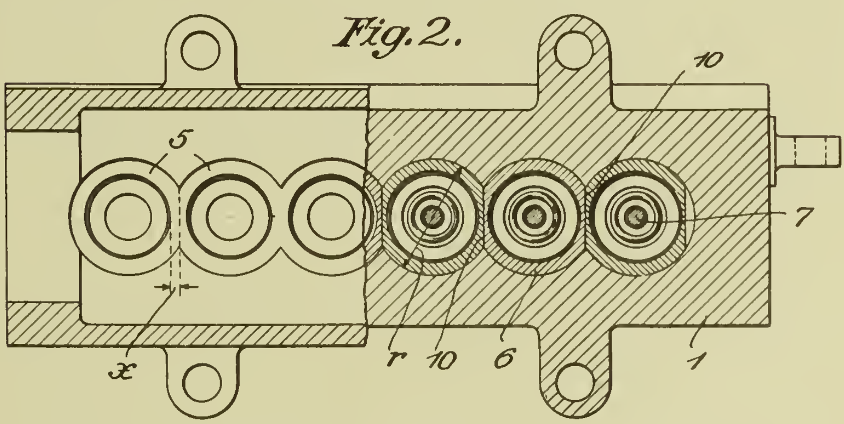


Fig. 2.

INVENTOR
Heinz Links
BY A. A. [signature]
[signature]
ATTORNEYS

Published May 11, 1943 Serial No. 358,184

ALIEN PROPERTY CUSTODIAN

PRODUCTION OF SILVER PREPARATION

Max Kollmar, Frankfurt A. M., Germany; vested in the Alien Property Custodian

No Drawing. Application filed September 24, 1940

My invention relates to the production of silver preparations for surface silvering of refractory or ceramic material, for example, glass, quartz, mica, stone ware, porcelain, magnesium silicate containing fragments or the like. More specifically it relates to the production of silver preparations containing oxides of the rare earths or other base metals, particularly manganese or its compounds.

Surface silvering may also be applied to highly refractory substances such as, for instance, sintered aluminium oxide, or masses containing mainly titanium dioxide, beryllium oxide or zirconium oxide. Thereby the silvering may be employed either as decoration or as an electrically leading surface to be used for electrotechnical purposes, especially in high-frequency practice.

If the usual silver preparations combined with fluxes, solvents and suspension means are applied to the aforementioned substances or objects and subsequently fired, the resulting coatings are very defective, especially when only small quantities of silver have been used on account of economic reasons. These coatings also show a bad adherence, reduced electric conductivity and are lacking in appearance. It was therefore indispensable to add a small quantity of a noble metal, for example iridium, to the silver preparations which addition was sufficient to produce well adhesive suitable silver coatings of considerable refractoriness.

In an effort to avoid the addition of the expensive noble metals I have made the observation that excellent effects may be obtained in using silver preparations which contain also metal compounds or metals less noble than silver, the oxides of which have a far higher melting point than the usually employed fluxes. Heavy metals have proved especially suitable, thus, for example, cerium, lathanium, thorium, uranium tantalum, nickel or the like. According to my invention, manganese exerts the most suitable effects. The forementioned metals may be employed either per se or in form of their compounds as, for instance, oxides or salts, but especially in form of their organic compounds. It has proved advantageous to use such organic compounds which are sufficiently soluble in the utilized solvents, for example, resinates, acetylacetonates, oleates or the like. All these substances may be employed either alone or in any desired mixture. Of course, an addition of small quantities of iridium may also be provided for, but in general such an addition is not necessary.

If desired, the new silver preparations may contain also some other fluxes, for instance, lead or bismuth compounds. These relatively low melting additions have but an adhesive effect and do not improve the other qualities, such as refractoriness, of the silver coatings.

The amount of my new additions may vary in wide ranges. In general, it is advantageous to keep the addition below 10%, preferably even below 1% of the whole mixture.

Examples

(1) 20 grs. finely divided silver powder are mixed with 1 g. basic bismuth nitrate, 4 grs. resinic acid manganese and 75 grs. of a 50% resin solution in oil of turpentine. This preparation is applied to glazed porcelain, dried and fired at 730° C.

A firmly adhesive, well leading coating of a beautiful metallic appearance is obtained. If desired, this coating may be polished as usual, in order to increase its metallic brightness. The same excellent results will be obtained by substituting the above mentioned quantity of manganese to one third for uranium oxide.

(2) The silver preparation was mixed according to Example 1 with the difference only that instead of manganese oxide half the amount of nickel was used. A sheet of mica was covered with this preparation and fired at a temperature of about 600° C. The coatings thus obtained show a very good electric conductivity and may be utilized for the manufacture of, for instance, electric condensators.

(3) Silver preparation, made according to Example 1, but adding the same amount of lanthanium oxide instead of manganese oxide. This preparation was burnt into glass at a temperature of about 500° C. The thus obtained substances may be employed for decorative purposes as well as electric purposes of all kinds.

MAX KOLLMAR.

[illegible]

[illegible]

[illegible]

[illegible]

Published May 11, 1943 Serial No. 358,279

ALIEN PROPERTY CUSTODIAN

PRODUCTION OF VITAMIN-F PREPARATIONS

Felix Grandel, Emmerich/Rhein, Germany; vested in the Alien Property Custodian

No Drawing. Application filed September 25, 1940

In my copending application for Letters Patent Serial No. 275,543 I have described a process for the production of durable and highly efficient Vitamin-F-preparations, characterized in that unsaturated carboxylic acids containing two or more conjugated double linkages in the molecule, or their dissociable derivation, or mixtures of such compounds, are diluted with solid or liquid substances.

I have now discovered that not only the fractions of unsaturated carboxylic acids containing two or more conjugated double linkages in the molecule, and their stereoisomeric forms and the dissociable derivations thereof, when diluted, have a highly intensified power of Vitamin-F effectiveness, as compared with that possessed by the 9,10 linoleic acid, but that this fact also applies to any hydrolysable compounds of the aforementioned classes of substances, e. g. the salts (soaps) of the above mentioned carboxylic acids. The same also applies to fatty acids with two or more conjugated double linkages, which at the same time are capable of both hydrolysation and dissociation, such as for instance the sodium salt of the sulphacid 9,11 glyceride of octadecadiene acid:

$$
\begin{array}{l}
CH_3.(CH_2)_5.(CH{=}CH)_2(CH_2)_7.COO.CH_2 \\
\qquad\qquad\qquad\qquad\qquad\qquad\quad | \\
CH_3.(CH_2)_6.(CH{=}CH)_2(CH_2)_7.COO.CH{-}CH_2O.SO_3Na
\end{array}
$$

These compounds with conjugated double linkages in the molecule, which are either hydrolysable, or are both hydrolysable and dissociable, in biological tests, if used pure, i. e. concentrated, display a toxic effect, whereas, surprisingly, they are not only deprived of these detrimental qualities, but also can be transformed into highly efficient Vitamin-F-preparations, if they are diluted with either solid or liquid substances, as described under the process of my copending application.

The aforementioned compounds with hydrolysable, or both hydrolysable and dissociable, conjugated systems in the molecule, display, moreover, an excellent emulsifying effect, wherefore they are particularly well adapted to be used for the preparation of oil-in-water, or water-in-oil emulsions, though for this purpose, it is advisable to disacidify and polymerise them.

It has furthermore been found that in the use of the free acids, and in particular in cases, where such compounds of the fatty acids are used, as are dissociable or hydrolysable, or both dissociable and hydrolysable, it is preferable, in order to stabilize the biological effect, to provide them with admixtures soluble in them and counteracting oxydation, especially with tocopherols (Vitamin-E) and/or with the natural substances containing Vitamin-E, e. g. germ-oils.

With this emulsifier, either alone, or in combination with the already known emulsifiers (e. g. such as are prepared on the basis of lanolin-alcohol, albumen-fatty-acid condensation products, albumen-emulsifiers) it will then also be possible to prepare stable and effective Vitamin-F emulsions. The importance of the fact that antioxydising substances, tocopherols and germ-oils containing Vitamin-E, or similar substances, are also used in addition, is that the hydrolysable, or both hydrolysable and dissociable, compounds with conjugated binary linkages as a characteristic feature of their constitution, are protected in the emulsion—if finely dispersed in water or the like—from a premature hydrolysis and from any oxydation and condensation resulting in biological ineffectiveness. In this manner it is possible to obtain preparations possessing a high biological effect, which can be prepared in accordance with the following prescriptions:

Examples

1. *Skin oil, containing about 2,000 Sheperd-Linn units of Vitamin-F per g (based on dry substance)*

9,11 glycerine of octadecadienic acid (disacidified and polymerised)	1.0
Germ-oil of wheat with high Vitamin-E contents biologically tested	1.0
Fatty alcohol of Spermaceti	25.0
Paraffine oil	23.0
Distilled water	50.0

A little quantity of perfume.

In the preparation of this skin oil it is essential that first of all the fatty ingredients are thoroughly mixed, and that the emulsifying action with water is only carried out thereafter. It is preferably to admix the scenting substance to the finished emulsion.

2. *Anti-sun-burning oil, containing about 1,000 Sheperd-Linn units of Vitamin-F per g (based on dry substance)*

Glycerine ester of Lican acid (disacidified)	0.5
Germ-oil of wheat with high Vitamin-E contents, biologically tested	55.5
Paraffine oil	40.0
"Antisolair" (L. Givaudan & Co., A.-G., Vernier-Geneva, Switzerland)	4.0

A certain quantity of perfume.

3. *Cold cream (skin food)*

Bees' ware (cera alba)	9.0
9,11 glycerine ester of octadecadiene acid (disacidified and polymerized)	9.0
Ceresine (paraffinum sodium)	2.0
Paraffine oil (German Pharmacopoeia VI)	55.0
Distilled water	24.0
Perfume	0.5
Borax (purest quality)	0.25
Cetylic alcohol (about 18,000 Sh-L-units per g (based on dry substance)	0.25

The cream is manufactured in such a way that wax, ceresine, paraffine oil, cetylic alcohol, are molten in a water-bath at 60 centigrades together with the 9,11 glycerine ester of octadecadiene acid. Thereupon perfume is added to this homogeneous molten mass, whereafter the stirring operation is further carried on, until the cream has become stable, which fact will have been brought about at ca 45 centigrades. Thereafter the creamy substance is poured out.

In this water-oil emulsion the ester acts as a biologically active emulsifier.

FELIX GRANDEL.

Published May 11, 1943 Serial No. 358,825

ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING CLUTCH DISCS FOR AIRPLANES

Masayosi Hasimoto, Azabu-ku, Tokyo, Japan; vested in the Alien Property Custodian

Application filed September 28, 1940

This invention relates upon the method of manufacturing clutch discs for airplanes. The advantage of this invention is to get the method of manufacturing the clutch disc which is constructed as follows: First corrode both surfaces of a stell clutch plate with a certain chemical and then drill holes through it. Next, coat it with phthalic hydride resin. Between the friction plate made of the asbestos cloth which is impregnated with phenolic resin having caustic soda as its catalyser and the clutch plate coated with phthalic phdride resin, insert an adhesive layer consisting of a sheet of asbestos paper which is impregnated with phenolic resin having ammonia as its catalyser. The friction plate, the asbestos paper, and the clutch plate are then tightly bound together by means of a piece of asbestos string, and heated and compressed in a mould of suitable shape so as to have the friction plate adhered firmly on the clutch plate.

The main object of this invention is to get the method of manufacturing the clutch disc suitable for use in clutching on or off the shaft of an engine which is rotating at an extremely high speed, within oil or in a very small space such as in airplanes.

The accompanying drawings show an example of applications of this invention:

Fig. 1 shows the front view of the cross-section of a part of the clutch plate.

Fig. 2 shows the plane view of the same.

Fig. 3 shows the front view of the longitudinal cross-section of the adhesive layer.

Fig. 4 shows the plane view of the same.

Fig. 5 shows the front view of the longitudinal cross-section of the friction plate.

Fig. 6 shows the plane view of the same.

Fig. 7 shows the front view of the cross-section of the clutch disc as assembled.

Fig. 8 shows the front view of the longitudinal cross-section of a part of the clutch disc constructed in accordance with this invention.

Fig. 9 shows the front view of the cross-section of a part of the completed clutch disc constructed in accordance with this invention.

Fig. 10 shows the plane view of the same.

The most advantage of this invention is to get the method of manufacturing the clutch disc for use in airplanes which is capable of being used for heavy load, at high speed, and within a very small space.

One example of applications of this invention is shown in the accompanying diagrams:

First, both surfaces and sides of the steel clutch plate **3** are corroded with a certain chemical and holes **2** are drilled through it. Second, the adhesive layer **4** is obtained by impregnated a sheet of soft asbestos paper with phenolic resin having ammonia as its catalyser and holes **5** are drilled through it. Third, the friction plate **6** is obtained by impregnating and drying a circular asbestos cloth of uniform cross-section with phenolic resin having caustic soda as its catalyser. Fourth, phthalic hydride resin is coated on the corroded parts of the clutch plate **3** on its both surfaces, and the adhesive layer **4** and the friction plate **6** are placed on each surface of the clutch plate. The clutch plate 3, the adhesive layer **4**, and the friction plate **6** are then bound tightly together by means of a piece of asbestos string through holes 2 and 5. Fifth, the clutch disc thus assembled is placed in a mould of proper shape and heated at a temperature of 180 degrees centigrade and compressed at a pressure of 5 tons per square inch for 2 minutes so as to adhere the friction plates **6** on the clutch plate. Finally the surface of the friction plates on both sides of the clutch plate are ground smooth by means of a grinder in order to obtain a finished product of clutch discs.

The phenolic resin having caustic soda as its catalyser possesses a proper degree of hardness but lacks adhesiveness, while the phenolic resin having ammonia as its catalyser possesses a high degree of adhesiveness but lacks adhesiveness against metal since the oil impregnates into it when heated within oil, though no variation is noticed in resin oil. The phthalic hydride resin possesses adhesiveness and the degree of adhesiveness does not change when heated within oil since the oil does not impregnate into the resin.

Because of the above-mentioned construction, we can expect that the clutch disc manufactured in accordance with this invention has a suitable value of coefficient of friction when used for airplanes and in a room at a temperature of 200 degrees centigrade or its vicinity, or within oil, it withstands for heavy load at high speed; therefore, there is no fear of the friction plate coming apart from the clutch plate.

MASAYOSI HASIMOTO.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

M. HASIMOTO
METHOD OF MANUFACTURING CLUTCH DISCS
FOR AIRPLANES
Filed Sept. 28, 1940

Serial No.
358,825

Fig. 1

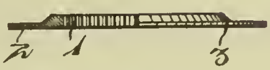


Fig. 2

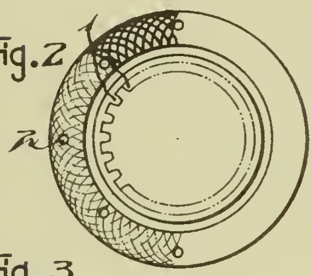


Fig. 9

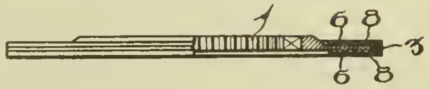


Fig. 10

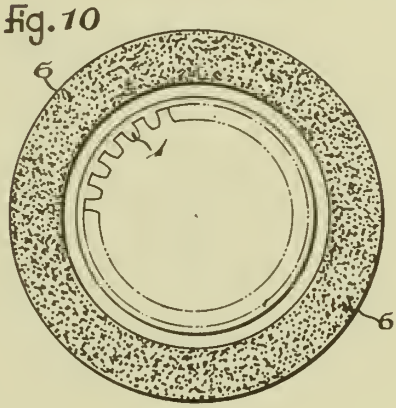


Fig. 3

Fig. 4

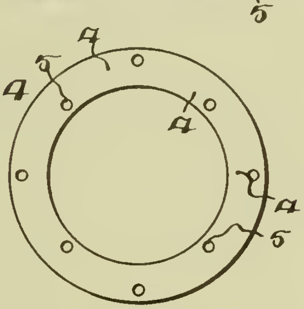


Fig. 8

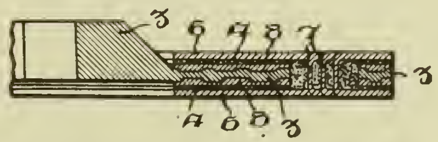


Fig. 5

Fig. 6

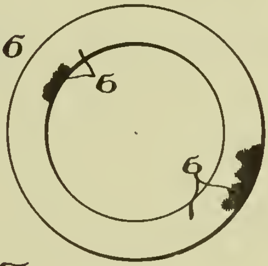
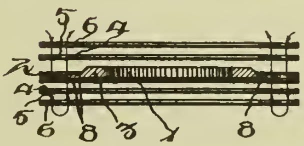


Fig. 7



Inventor

MASAYOSI HASIMOTO,

By [signature] Attorney

Published May 11, 1943

Serial No. 358,942

ALIEN PROPERTY CUSTODIAN

BLEACHING PROCESS FOR FLUIDS

Heinrich Schmidt, Niedercunnersdorf, Germany; vested in the Alien Property Custodian

No Drawing. Application filed September 28, 1940

This invention relates to processes for bleaching or reducing the discoloration of liquids and juices or the like with the aid of hydrogen peroxide.

Basically considered, these processes involve bleaching or decoloring liquids by treating them with hydrogen peroxide vapor. Heretofore prior art bleaching processes wherein hydrogen peroxide was used were operated at reaction conditions at which the hydrogen peroxide was in liquid form, that is the bleaching or decoloring was carried out by simply adding a quantity of hydrogen peroxide to the liquid to be bleached. Although the prior art processes seem satisfactory, simple and fool-proof, they have proven to be unsatisfactory in some cases, particularly in the decoloring of sugar juices before they are concentrated, and in the bleaching of table oils and fats.

The particular difficulty in these cases is that the substances are sensitive and that the resulting product must be peroxide free. Since it is impossible to gauge accurately the amount needed, the excess must be removed by resorting to a further processing. Prior workers have also proposed to decolor liquids with the aid of gaseous sulfurous acid, chlorine or ozone as well as to treat solids with gas-forming hydrogen peroxide.

In accordance with a preferred embodiment of this invention, liquids, such as sugar juices and table oils, are bleached or decolored by treating them with vaporous hydrogen peroxide. The reaction conditions are such that the process may be carried out in the form of a continuous reaction. It is merely essential that the treatment be carried out in an apparatus which will permit the liquid to be treated to be in the apparatus in an agitated state so as to cause a proportionately large surface area of the liquid to be exposed to vapors containing hydrogen peroxide which are simultaneously present in the apparatus.

In carrying out the process of my invention, it is preferably advisable to make use of apparatus which will permit the use of a continuous process. For example, it is preferable to make use of a spray tower or other tower into which the liquid to be bleached can be introduced at the top and made to pass downwardly therethrough in thin agitated layers which are in contact with vaporous peroxide flowing in countercurrent. A continuous process of this latter type is susceptible of ready control of the degree of bleaching. This control may be exercised by varying the construction of the apparatus itself, that is, by changing the length of the route taken by the material to be bleached. This may be done in any number of ways, for example, by varying the length of the tower, varying the amount and type of fillers (Raschig rings, plates, etc.) or by the variation of corresponding built in irrigation surfaces.

The control of the bleaching process may also be affected by other means, for example, by the presence of various catalysts in the tower, for example: rings, plates etc. with surfaces made of metals or chemicals which are catalysts for H_2O_2 (Fe, Ni, Co, Mn, Ag, Pt, MnO_2, Co_2O_3, Fe_2O_3, etc.) and/or adding such chemicals ($CO(NO_3)_2$, $CoSo_4$, $CuSo_4$, $NiSO_4$, $Fe(NO_3)_2$ etc.) in small parts to the liquid to be bleached, by the respective concentrations of the liquids to be bleached and of the bleaching agent present, by varying the speeds at which the material to be bleached passes through the tower and by regulating the temperatures of the tower, of the material to be bleached and of the bleaching agent. The reaction may also be influenced by pressure conditions in the apparatus. However, although either superatmospheric or subatmospheric pressures are preferably used, the process may also be carried out at normal pressures.

The temperature conditions may be varied over a wide range. For example, in another preferred embodiment of my invention, the temperatures of the various mediums may be regulated in such manner that a fractional condensation of the bleaching agent on thin layers of bleaching material takes place in the upper portion of the tower, while the temperatures of the lower portion of the tower and the mediums are so regulated that any excess in bleaching agent present in the material to be decolored is again vaporized therefrom in the lower portion of the tower. It is thereby possible to have the bleaching agent react in liquid form on the material to be bleached during the first step of the process regardless of the concentration of the vapors while the previouslly condensed excess of bleaching agent which reaches the lower portion of the tower vaporizes therefrom and increases the concentration of the bleaching vapor entering the apparatus. This process guarantees a dependable and rational execution of the decoloring process even in the most difficult cases.

It has been found that by using this process even very sensitive liquids, such as table oils, liquid fats, and the like, may be bleached without harm because only enough peroxide is withdrawn from the bleaching vapors as is required to decolor or bleach the material.

It is therefore possible, by adjusting the reaction conditions in the apparatus, to take care of maximum discoloration, to use this process to decolor satisfactorily sensitive liquids whose discoloration may vary over a wide range. For example, it is possible by using this process to decolor satisfactorily thickened sugar juices which leave the boilers with all shades of discoloration.

The bleaching agent, which is introduced into the bottom of the apparatus and passes up in countercurrent and reaches the top of the tower, may be withdrawn therefrom by suction or some other suitable means, accumulated and used again after its concentration has been brought up to that the bleaching vapor initially introduced into the tower. In this manner, it is possible to carry out the process in a rapid, satisfactory, economic matter without loss of bleaching agent, and without harm to the materials bleached.

It will be understood that the embodiments of my invention described in this specification are only specific examples of the processes utilizing the principles of the invention. It is therefore desirable that the invention be interpreted broadly within the scope and spirit thereof.

HEINRICH SCHMIDT.

Published May 11, 1943 Serial No. 358,278

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF SUBSTANCES EXPEDITING THE GROWTH OF CELLS

Felix Grandel, Emmerich/Rhein, Curt Enders, Munchen, and Max Hegendörfer, Emmerich/Rhein, Germany; vested in the Alien Property Custodian

No Drawing. Application filed September 25, 1940

This invention relates to a novel process for the production of substances expediting the growth of cells.

It has already been suggested to produce growth expediting substances which cause the multiplication of cells from aqueous extracts of yeast or other microbes, seeds, germs or egg yolk after previous elimination of ballast substances by way of adsorption, e. g. with fuller's earth, or by precipitation, and repeated precipitation, if necessary, with a solvent which can be mixed with water, or with heavy-metal salts. Thereupon non-efficient substances were removed from the solution thus prepared, by precipitation with Reinecke-salt, picrolonic acid or oxalic acid, whereafter the active substance was precipitated with phosphoric tungstate acid, or mecuric chloride.

Under another process platinous chloride hydrochloric acid was used for biotina concentration. All of these processes imply the drawback that for the biotina concentration from the raw materials:

1. Many stages of operation are necessary, part of which is very difficult to be performed;
2. Expensive chemicals, e. g. hexaplatinum hydracide, must be used;
3. The substances used as primary material. e. g. germs of plants, yolk of eggs, compressed yeast, etc., are, already in themselves, valuable substances, which therefore, due to their high purchase prices, cannot be considered for the manufacture of technical bios-concentrations.

Therefore, in consequence of their expensiveness, bios-concentrations of the biotina type according to Kögl etc., are out of the question for further pharmaceutical or technical uses.

The present invention has for its object a process under which highly efficient bios concentrations are prepared in a simple and unexpensive manner, substances, in this regard, coming under the term "Bios," which expedite the cell growth.

It is already known that yolk of eggs, yeast and other tissues in their embryonic condition are a particularly suitable primary material rich in bios for the preparation of bios concentrations. It is also known that germs of cereals and fungoid mycelium show considerable bios contents. In order to prepare bios-efficient concentrations from the said primary materials rich in bios, it is usual to proceed in such a way that these materials are more or less disintegrated or broken-up, extracted with water or aqueous salt solutions, filtered, whereupon the filtrates thus obtained are further processed. Thus the hitherto used methods of manufacture without any exception amount to a lixiviation process, in which the substance to be lixiviated is suspended in the solvent, generally water. This method implies the fact that the quantity of extracting agents is comparatively great, as compared with the comparatively small quantity of material rich in bios, which is to be lixiviated, and that the aqueous filtrates thus obtained contain the bios-efficient substances in a highly diluted condition. In order not to be compelled to concentrate by evaporation said diluted aqueous solutions, it was inevitable to avail oneself of expensive precipitation reactions, in order to thus render possible a concentration of, and at the same time an enrichment in, the bios substances.

It was now surprisingly found that it is possible to directly bring about bios concentrates without any precipitation, if primary substances rich in bios e. g. cerealian germs, and fungous mycelia, are subjected to a steaming action or to an extraction with steam, i. e. if limited quantities, preferably small quantities of water or steam, in vacuo and at ordinary or increased pressure are allowed to display their effect upon the primary materials rich in bios within a sealed steam chest, which, if desirable, can be provided with a backflow condenser. The steam extracts thus obtained will already contain bios at a concentration of 250 to 5000 YU* for example, wherefore, as compared with the primary materials used, which possess, as an example, a bios effect of about 10 to 100 YU, they are already to be considered as highly effective bios concentrates.

As the bios effect not only represents a function of the bios concentration in the individual solution concerned, but to a very considerable extent depends upon the quantities of counteracting agents, small amounts of which are always present in the natural substances it is possible, as a further step of this invention, to discharge the efficient raw bios concentrates prepared under the new process in a simple and cheap manner from the concentrating agents still present in them, if they are treated with hydroxides of alkaline earths. The highly efficient and aqueous pure bios concentrates resulting from the treatment with hydroxides of

* By a YU (Yeast Unit—German "HE":Hefe Einheit) that effect of growth is meant, which is brought about by 1 g of dry substance of the bios preparation in order to attain the factor "f_n", when using the tests prepared by the inventors for the ascertainment of bios.

alkaline earths after, a subsequent filtration have an effect of about 500 to 25000 YU, and can be concentrated still further by evaporation up to the dry condition.

Both the unpurified efficient, aqueous raw bios concentrates, and the aqueous pure concentrates treated with hydroxides of alkaline earths, as well as the dry residues prepared from them, can advantageously be used for technical purposes in the manufacture of compressed yeast, for baking purposes and pharmaceutical uses.

By way of experiments it has, moreover, been ascertained that husks of any fruits, e. g. husks of haselnuts and walnuts, and such, as have been passed through an artificial fermentation process, e. g. cocoa-shells, are very well suitable for use as cheap primary materials rich in bios.

A special advantage offered by the new process is the fact that the measures taken for the preparation of bios concentrates only display a little influence upon the primary materials, which therefore can still be used for other purposes.

Examples

1. 20 kg of wheat germ cakes, i. e. residues left after compression in the manufacture of wheat germ oil, having bios contents of about 13 YU, are disintegrated, and pieces having the size of haselnuts, and are, e. g. in hoses, put into the steam extraction device with a backflow cooling device described above, whereupon they are extracted with 10 1 of water, and steam respectively, for about 24 hours at about 90 centigrades and at atmospheric pressure. After cooling about 7,5 1 of a yellow aqueous liquid, having a smell like malt, and 22 kg of humid material will be left. The balance of 2,5 1 of liquid will continue to be adsorbed by the material extracted. A further quantity of 20 kg of wheat germ cakes can be treated with these 7,5 1 of bios raw concentrate, as described above, and this process can, if desired, be repeated with further lots. Thus it is possible to obtain highly concentrated preparations rich in bios.

The remaining balance of extracted wheat germ cake residues poor in bios, are either dried and ground to powder, or are, in their humid condition, ground together with other wheat germ cake not having been treated. In either alternative it is thus possible to manufacture feeding stuffs, the value of which will not be reduced in the least by the treatment. For this reason the residues can, without anything further, be used in the manufacture of other pharmaceutical preparations, e. g. germ extract. The bios raw concentrate of wheat germs which was, for instance, obtained, by an individual process of extraction, showed an effect of 250 YU. The lime still dissolved was quantitatively removed from the filtrate obtained with gaseous carbonic acid by an addition to the extract of the same quantity of lime milk and by removal of the deposit charged with ballast substances. The resulting concentrate having a light yellow shade showed a bios effect of 500 YU.

2. 30 kg of humid mycelium of fungus containing 75% of water and 125 YU from citric acid fermentation (aspergillus) was filled into elastic metal tubes, and at water boiling temperature and at ordinary pressure for 24 hours with reflux treated with 10 1 of water, and steam respectively.

After cooling about 11,1 kg of concentrate rich in bios are left. The solid extraction residues (24,2 kg) are now pressed in a filter-squeezer at a pressure of 350 atmospheres for several minutes. The pressed juice (3 1) thus obtained is added to the extracted solution. The dark-coloured bios raw concentrate resulting from one extraction stage, and having an effect of about 280 YU is, in accordance with Example 1, raised to an effect of 625 YU by precipitation with hydroxide of alcaline earths. The fair coloured solution can then be concentrated still further. The solid extraction residues which has a smell and taste reminding of bouillon, and to a high degree is freed of vegetable bitters, can under the already known processes be further used it order to prepare sterines and albuminous alimentary substances, e. g. soup seasoning extract.

3. 30 kg. of cocoa husks having an effect of 100 YU are put into hoses, when not yet ground, and are, with reflux, extracted for 24 hours with 10 1 of water, and steam, respectively. One to the low adsorptive capacity of cocoa shells for water about 3,5 1 of raw concentrate rich in bios will be obtained. The 33 kg of extracted residues resulting from the cocoa shell extraction are dried and finely ground down with Perplex grinders. This material can be added to humid food-stuffs, e. g. shredded beet-roots or pig fattening food, etc., just as the marketable cocoa husk powder, because its food value has not been reduced.

The extraction with steam can, after addition of an adequate further quantity of water, be repeated as often, as desired, with the quantity of water left after the first extraction, whereby also in this case always higher concentrates of raw bios will be produced. The concentration of the coloured raw concentrate obtained after the first steaming action and having an effect of 5000 YU, is carried out, as described in Examples 1 and 2. The effect of the almost colourless concentrate obtained by the precipitation with hydroxides of alcaline earths amounted to about 25,000 YU.

The preparations manufactured under the process are suitable to be used for processes of fermentation in bakeries, breweries, distilling plants, in the yeast industry, etc.

FELIX GRANDEL.
MAX HEGENDÖRFER.
CURT ENDERS.

Published May 11, 1943

Serial No. 359,575

ALIEN PROPERTY CUSTODIAN

PURIFICATION OF SUGAR CONTAINING LIQUIDS

Pieter Smit, Zandvoort, Netherlands; vested in the Alien Property Custodian

No Drawing. Application filed October 3, 1940

In addition to the existing methods to purify sugar containing liquids, e. g. sugar juices, whereby frequently lime, whether or not used in excess, is applied, which lime is later on precipitated and removed with the aid of carbonic or sulphurous acid, of late also other purification agents like infusorial earth, activated carbon, colloidal humic substances, etc. are applied.

However, the ideal of a good purification, viz. the removal of practically all non-sugar substances, like inorganic and organic salts etc., even has not yet been approached.

In the cane and beet sugar industry after an intensive purification, the juice still contains on 100 parts of solid matter besides 90–93% of saccharose, 7–10% of the so-called non-sugars. It needs no explanation how harmful this is, because: *a.* The liquid can only be freed from sugar by repeated crystallization *b.* Finally a sugar liquid, blackstrap, is left, which still contains about 50% of sugar, which will not crystallize out, because the non-sugars hinder this and which thus remains in this blackstrap and gets lost for consumption, at least is only of value as forage or for manufacturing alcohol.

Now, according to my invention, the sugar containing liquid is wholly or partially freed from non-sugars by bringing the liquid successively into contact with substances of contrary polar binding and adsorptive power. Thus the acid reacting substances (anions) and the substances with negative electric load on the one side are removed by the positive polar substances and the basic reacting substances (cations) and the substances with positive electric load on the other by the negative polar substance. The substances having polar binding and adsorptive power, which are applied according to my invention, are under the circumstances of their application practically insoluble and also form practically insoluble components. They are of micellar structure. Certain equilibriums occur at the binding or adsorption, which obey generally known principles and have frequently been the subject of scientific study.

Not only substances having a certain electric load are isolated in this way, but also the substances having not a noticeable load or being of amphoter character. According to my new method besides the electrolytes, also the non-electrolytes can be removed from the sugar solution to a rather large extent, as will be shown by the examples.

From the electrolytes not only the strongly dissociated ones are removed, but especially rather easily the weakly dissociated, organic acids or substances the acid character of which may hardly be observed or is available in latent condition.

This is especially evident, if blackstrap is subjected to the treatment, in which liquid, as is known, all non-sugars are accumulated, so that the contents amount to 30–40% of the solid weight. In fact strong alkalis occur in same, about 15% of K_2O of the non-sugar weight, 2½% of Na_2O and still some percents of the weaker inorganic bases and also 1%–2% of strong organic acids, but about 75% consist of weak organic acids and non electrolytical organic matter, esters, albumines, etc. By the new method all these substances can be removed for the greater part in a simple way, which will appear from the examples. The most striking feature hereby is, that the organic acids or bases and non-electrolytes can be removed as well as or even better than the strong dissociated inorganic substances, having a very large affinity to the polar adsorbents. It might be expected that in presence of these strong dissociated inorganic substances they could not be removed practically, but this is still possible, whereas the capacity of the material for eliminating the strong dissociated inorganic substances is only very little influenced by them. The elimination of these substances must thus probably be of a complicated nature, double binding and condensation phenomenons certainly occur.

Some investigators consider this phenomenon as a normal chemical binding, but in any case it must then be taken for granted, that the reaction is very reversible, which e. g. is shown by the fact, that anions are much more strongly adsorbed from a very strong acid milieu.

Other investigators wish to see in the binding of the substances by the products, which are applied according to the present invention, a normal adsorption and declare the ion-exchange to be a result of the slight solubility, which also practically insoluble substances possesss, whereas the large exchange capacity of some materials is a result of their micellar structure. It is a matter of fact, that the binding phenomenons sometimes may be declared much more easily by chemical binding, sometimes by physical adsorption. However, it is important, that one is practically able to remove the desired impurities from the sugar-solutions, provided this can take place under the right circumstances.

In order to demonstrate this with an example: according to the new working method it would practically not be possible to remove the salt from seawater, viz. because by percolation over the negative polar adsorbent, the slightest cation-binding would cause such low a pH, that further binding becomes only possible, after the acid has been removed. Thus a very large number of cycles must be applied, which practically is impossible, whereas furthermore for the regeneration of the substances with polar binding power

more leaching water is needed than the process yields. When, however, purifying a sugar solution, the salt can be removed for the greater part in one single cycle, because when binding cations a low pH only occurs after a very large removal, viz. the freed organic acids do not cause a strong decrease of pH. It also is of no importance how much leaching water is required for the regeneration. The cost of same is minimal with regard to the one of the sugar solution.

With regard to the foregoing it is also practically possible to free the strongly acidified sugar solutions, e. g. those, which are obtained by the conversion of flour, from acid by a treatment with the positive polar substances. The treatment with the negative polar substance then needs only take place to a very small extent.

When proceeding according to my invention, the decolouration especially when applying the positive polar adsorbent, is enormous and larger than may be obtained with any known decolourizing agent. Also as a result of this, the invention gets technically very important, because there are no decolourizing agents, which are able to remove similar substances.

There are many substances known which have polar binding power, which under the required circumstances are practically insoluble and may be applied when working according to my new method.

From the inorganic substances the zeolithes, which can bind cations, are known. However, owing to their large solubility, especially at a lower pH, they are unsuitable. As negative polar adsorbents, however, such materials, as are obtained by the reaction of sulphuric acid and equivalent dehydrating agents on carbonaceous material, e. g. coal, are excellently suitable.

These materials resist a treatment with the strongest chemicals. For the elimination of acid-radicals, various metal-oxide-gels are known, e. g. iron-oxide-gels and gels of copper-oxide, manganese-oxide, chrome-oxide, aluminium-oxide etc. Frequently these gels are precipitated on bearers. Natural bauxite, which contains much iron-oxide, is also often suitable. The suitability frequently lies between a certain pH-range, for fresh aluminium-oxide-gel e. g between 4.8 and 8. By drying the material, this range can be increased. However, it is a matter of fact that the application of this kind of substances does not lead to practical results as per the present invention.

As positive polar substances further since years ago many of the so called bases of Schiff are known and other insoluble resinous condensation products or dye stuffs of alkaline character, provided they meet the requirements of practical insolubility when used in my process.

Raikow found already in 1896 (Berichte 1896) that a condensation product from formalin and anilin has a basic character, is practically insoluble and also forms insoluble salts. This refers to all condensation products from aldehydes and cyclic compounds with amin-groups or imin-groups, if condensation takes place in the right way. Like the above- and hereunder mentioned resins, they have a micellar structure.

A very cheap positive substance, however mostly less active, is the reaction product of sulphuric acid and the like on carbonacecus material, sawdust etc., which product is a kind of humic acid and in which ammonia has been incorporated.

As a negative polar substance at present also synthetical resins on phenol basis are known and also some practically insoluble organic acids. For binding acid radicals, various natural nitrogenous organic products, wool etc. are known. Technically their importance is little.

However, applicant has found that many of these synthetical resins are of amphoter character. Thus a resin being negatively polar, also under the right circumstances may act as positive polar adsorbent and this reversion frequently also takes place with positive polar substances. To a still larger extent, this refers to the substances with a weak electric load, or if they themselves are of amphoter character.

The process may be applied in various stages of the treatment of sugar extracts. Sometimes it is advisable to apply the process immediately after the extraction, in order to avoid other expensive purification methods in the sugar industry, as a large excess of lime, which is later precipitated with carbonic acid or sulphurous acid.

It is known, that by this lime treatment many valuable substances are destroyed, vitamines etc. According to the new process one is able to separate these. However, when treating raw materials of inferior quality, the binding capacity of the polar adsorbents is influenced unfavourably.

Technically it is of importance that blackstrap, being a waste product as has already been explained above, may be gathered from different factories and can be subjected to the new process. As a result thereof one succeeds in crystallizing the sugar which is present in the blackstrap for the greater part. It is also possible to sell this treated backstrap as a syrup for human consumption. This syrup excels in a low non sugar content and fine aromatic taste, even if the raw material is the very badly tasting blackstrap of beet.

It goes without saying that the method is also very suitable for the treatment of already purified extracts, whether concentrated or not.

In glucose manufacture a fine result may be obtained, if the converted juice is first treated with a positive polar substance and thereafter with a negative polar one.

The application of the working method takes place in a simple way by percolation of the liquid over thick layers of the polar substances, which in this case have to be of granular structure. However, a treatment with powdery substances, which are filtered-off afterwards also leads to proper results, but this way of application is more expensive and requires much labour.

By applying substances of granular structure one is also better able to use the principle of counter current. The application of this principle is always of advantage in case of reactions of equilibrium, with which one has to do in this case.

For preference the liquid to be treated be first percolated over the negative polar substance and thereafter over the positive polar substance. As soon as important quantities of substances to be removed break through one of the contact filters. this filter must be cut out. According to the principle of counter current, finally a greater quantity of liquid can be treated if one does not apply one filter of each kind consecutively but more. Hereby care must be taken that the liquid by turns passes a filter containing negative polar contactmass, one containing positive polar contactmass, one containing negative polar contact-

mass etc. By turns, a filter, viz. the one which has been into contact with the fresh liquid, must be prepared for a new purification of the liquid by treating it with a suitable solution of electrolytes. Then this filter comes into contact with the liquid, which has already passed all the other filters.

The principle of counter current is also applied, if one uses one filter of each kind, but keeps operating some time after the liquid has broken through and pumps the liquid—which has passed thereafter—over the contactmass again after this has been regenerated.

One acts also according to this principle, if one carries the regenerating-liquid through the contactmass in opposite direction to the liquid to be purified. Whether the principle of counter-current can be applied to advantage, depends on the price of the chemicals, which are used for the regeneration and whether the chute in neutralizing power of the contactmass occurs rapidly or slowly, that is to say whether the breaking through of the substances to be removed, increases rapidly or slowly. In the latter case a more or less complete application of the principle of counter current is of advantage. When making use of synthetical resins this is the case to a large extent, the load becomes much greater, e. g. in case of higher acidity of the liquid.

In some cases a contactmass, consisting of a mixture of the negative and positive polar substances may be applied, viz. if the regeneration of the substances can take place in the same way, or with chemicals which regenerate one of the substances without disturbing the capacity of the other.

If e. g. sulphuric acid is used as regenerating agent, such as mentioned in Example 2, one can proceed in this way. Sulphurous acid is also very suitable as a regenerating agent, especially for the positive polar substance. The sulphurous acid applied in excess pushes away the impurities absorbed and may be driven out of the acid-binding resin by steaming or heating.

If the substances are introduced into a liquid, in which certain ions prevail, these ions are incorporated in the substance. As well the removal of the substances from the liquids to be treated as the regeneration of the polar adsorbents is based on this principle.

Applicant has found, that when making use of synthetical resins, which bind acids a. o. polarly, the loading is much higher if these acids are present in a milieu of low pH. Practically this is the only right method to remove a large quantity of the acids from the sugar solutions, at least it offers big advantages. Only if this low pH meets with objections, one may derogate from it. On that account one will not carry thick juice in sugar factories over two percolators, but over various ones, which by turns contain the different substances with polar binding power.

The chemicals which can serve for the regeneration, principally sulphuric acid, hydrochloric acid, soda, caustic soda, lime and sodium chloride, are cheap, but frequently have to be applied in a large excess, for which reason the solutions are often systematically used repeatedly. In sugar factories, in which one disposes very often of strong alcaline condensed water from the evaporation plant, this is a cheap regenerating liquid. especially for the alcaline contactmass.

For the regeneration of the negative polar substance a treatment with acid is best, as applicant has found. A modification of this working method is the use of sulphurous acid, which has sterilizing capacities and which besides by washing can also be removed in a simple way by steaming or heating.

Also for the regeneration of the positive polar substance, this regeneration method with sulphurous acid is extremely suitable, as applicant has found. The sulphuric acid can be applied in excess, because it may be easily recuperated out of the liquid by heating and consequently all substances adsorbed can be driven out of the mass to be regenerated.

When regenerating the positive polar substance according to the present working method, also a good result may be obtained—if much water is available—by washing the mass to be regenerated during a long time. The impurities absorbed are then carried way. The process can be accelerated if hot water is used.

If an alkali treatment for the regeneration of the positive polar substance is applied, a diluted lime solution is better and cheaper than a solution of soda or caustic soda. Furthermore a solution of lime is much easier to be removed from the mass by rinsing.

It may be that in the long run on the polar adsorbents substances accumulate, which are not removed by the above mentioned regenerating method. In this case a treatment of the positive polar substance with strong solutions of caustic soda and of strong sulphuric acid, to which eventually oxidation agents have been added, is advisable. The negative polar substance is treated in the most suitable way with strong sulphuric acid. It is also possible to get rid of the strongly adsorbed organic substances in the biological way, especially of the albuminous compounds. This method has formerly also been suggested for the regeneration of bone char, but here almost the same result could be obtained by glowing the bone char.

However, the present polar substances cannot be glown, because they then would lose their activity.

At this biological purification of the substances in question, micro-organisms of different nature play part. These micro-organisms can also be cultivated separately; they are present nearly everywhere in the nature. The cultivation of these microorganisms and the destruction of the impurities adsorbed are furthered in a weak acid milieu and at moderate increased temperature (30–40° C). It is also desirable that air can get admittance, because the fermentation which occurs is principally of an oxidative nature.

It goes without saying, that, if one wants to gather the substances accumulated in the contactmass on account of their value, regenerating liquids of suitable composition and concentration should be applied. Mostly strongly concentrated solutions will be applied in order not to obtain the liquids to be gathered in a too dilute condition.

An advantage not to be underestimated of the present method is this, that mostly the liquid can be filtered over the contactmass in cold condition or at moderate temperatures. Decomposing losses of sugars and albumines then do not occur, whereas still the colloids which hinder filtration are removed and which, when applying the old methods, could only be made harmless by a thorough heating and with the aid of chemicals. Moreover the substances to be gained with the contactmasses are not decomposed or coagulated.

I give hereunder the following examples:

Example 1

Blackstrap of beet with a sugar content of 51%, water-content 18%, ash content 9.8%, is diluted to 65 Brix with the aid of a sugar containing liquid to be mentioned later on, the pH=7.9.

This liquid is treated wth 5% of an active humus, made of sawdust with the aid of sulphuric acid, heated to 80° C and filtered, on account of which the pH decreases to 7 and the Brix to 60.

This liquid is successively filtered over a contactmass of a substance, obtained by the reaction of gaseous SO_3 on coal at a tempertaure of about 100° C, and over a contactmass of synthetical resin obtained by the reaction of formalin on metaphenylendiamin.

The negative polar contactmass has a size of grain of 0.25–1 mm. and is stored in an iron container, which is covered with ebonite. This container has a net content of 6000 L. and contains 2900 kg of the substance. The positive polar contactmass has an equal size of grain and is also stored in an iron container covered with ebonite with a net content of 7500 L. containing 2500 kg of the substance. The substances are put on layers of sand. Both containers are filled with water up to the surface (level) of the mass; a suitable overflow tube takes care that the mass cannot become dry.

Now over both masses, respectively 2500 L. of water, which contains 320 kg of HCl, and 3750 L., which contains 350 kg of caustic soda, are introduced from the top downward, thereafter respectively 4000 L. and 8000 L. of water.

Then 4000 L. of the dilute blackstrap are carried over the negative polar substance, afterwards 3000 L. of water and finally the regenerating liquid and the leaching water.

The liquid running first out of the filter is water, only at 3 Brix concentration one gathers separately, viz. successively:

1000 L. of liquid, concentration 10.2 Brix
1000 L. of liquid, concentration 25.1 Brix
1000 L. of liquid, concentration 40.4 Brix
1000 L. of liquid, concentration 39.2 Brix
1000 L. of liquid, concentration 35.– Brix
1000 L. of liquid, concentration 29.2 Brix
1000 L. of liquid, concentration 22.2 Brix
1000 L. of liquid, concentration 14.1 Brix
1000 L. of liquid, concentration 7.3 Brix
1000 L. of liquid, concentration 4.– Brix

The then following liquid is thrown away.

The sugar solutions collected are carried successively over the positive polar contactmass, then 3000 L. of water and finally also the regenerating liquid and the leaching water.

The liquid running first out of the filter is water, only at 3 Brix concentration the liquid is gathered viz.

1000 L. of liquid, concentration 5.– Brix
1000 L. of liquid, concentration 10.4 Brix
1000 L. of liquid, concentration 18.9 Brix
1000 L' of liquid, concentration 25.4 Brix
1000 L. of liquid, concentration 28.3 Brix
1000 L. of liquid, concentration 27.4 Brix
1000 L. of liquid, concentration 25.6 Brix
1000 L. of liquid, concentration 20.0 Brix
1000 L. of liquid, concentration 13.4 Brix
1000 L. of liquid, conceneration 7.6 Brix
1000 L. of liquid, concentration 4.– Brix

The then following liquid is thrown away.

The pH of the liquid, which has passed the negative polar substance, has decreased considerably, to abt. 2.8, that of the liquid, which has passed the positive polar substance, is normal again and practically neutral. Only the last running-off sugar solution shows a low pH again.

From the solid matter introduced abt. 87% passes the negative polar contactmass, abt. 72% the positive polar contact mass. This last filtrate as far as the colour, purity and crystallizing power are concerned, does not yield to purified thick juice.

The largest removal of colour is to be attributed to the positive polar substance, after having passed this mass the liquid still contains about 15% of the original coloring matter. The negative polar contactmass removes only 10% of the coloring matter.

The dilute first running and running-off of the filtrates are used for diluting the original blackstrap.

In the regenerating liquid of the negative polar contactmass all potassium be accumulated, also betaine, in the one of the positive polar mass all organic acids, the valuable glutaminacid e. g. and other organic matter. These liquids may be worked on these products.

The positive polar contactmass has often a tendency to disperse originally and to give off colour. In this case it is desirable to carry the first running of the positive polar mass over the negative polar mass, as a result of which this dispersion is separated.

Example 2

The polar adsorbents are mixed or placed in layers on each other in a container, having a net contents of 13.000 liters. Through this container the blackstrap diluted as per Example 1 in the same quantity is filtered. The regeneration takes place with 600 kilos of sulphuric acid. On account of this the working method is very much simplified, although the removal of non-sugars, particularly of colour takes place to a less extent. Finally the liquid is strongly acid, owing to the sulphuric acid, which has to be precipitated with baryt and filtered off. If a negative polar contactmass, proof against lye, is used, regeneration with a lye- or soda-solution is also possible.

Example 3

The regeneration of the positive polar mass from Example 1, takes place by carrying through water, in which sulphurous gas is blown.

As soon as the running-off rinsing water is almost freed from the impurities rinsed from the positive polar substance, the mass is steamed out.

The free sulphurous acid can be gathered.

Example 4

In Example 3 exclusively hot town water is used for rinsing purposes till in the running-off water practically no more impurities occur. Then the mass is sterilized by steaming out.

Example 5

In Example 4 water saturated with lime is used and this is rinsed out with town water, as soon as there are practically no more impurities present in the running-off liquid.

Example 6

Over the same apparatus as applied in Example 1, unheated diffusion juice obtained from beets or press juice from sugar cane, can be carried.

The regeneration takes place in the same way. From the regenerating liquids pectin-substances etc. can be gained.

It is desirable to sterilize the filters from time to time e. g. by steaming or boiling out with hot water.

Example 7

As per Example 1 liquors from refineries can be treated, principally in view of decolouration to replace the bone-char-treatment. The decolourizing expenses are much lower.

PIETER SMIT.

Published May 11, 1943 Serial No. 359,744

ALIEN PROPERTY CUSTODIAN

PREPARATION OF COMPOSITE RUBBER ARTICLES

Otto Hecht and Hans Prillwitz, Ludwigshafen, Rhine, and Ivo Dane, Leverkusen-Schlebusch, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 4, 1940

The present invention relates to improvements in the preparation of composite rubber articles.

It is known that the adhesive capacity of rubber or rubber mixtures can be improved by the incorporation therewith of certain resins such as colophony. This is true of natural rubber as well as of the various synthetic rubber-like materials.

It is the object of our present invention to develop a new adhesive agent which is capable of imparting to rubber or rubber mixtures a better adhesive capacity than it can be achieved by means of the hitherto employed auxiliary agents, such as colophony. Other objects of our invention will be apparent from the following description.

In the following the term "rubber" will have to be understood as comprising natural rubber as well as synthetic rubber-like materials, and compounded rubber mixtures as well as non-compounded materials, and also vulcanized products as well as non-vulcanized materials, unless otherwise stated. The term "composite rubber articles" is intended to include every article which consists of rubber wholly or in part and which has been built up by duplicating at least two layers or sheets or other articles of unvulcanized rubber. By the term "incorporating" we mean any manner of distributing a product within another medium either throughout the latter or only at the surface thereof.

The adhesive agents which have proved to be particularly suitable for the purpose in question and to be superior to the hitherto employed adhesive agents such as colophony may be defined as products of the interaction of acetylene and a mononuclear monovalent alkylated phenol. More particularly, we are working with such products as have been prepared from a mononuclear monovalent p-alkylated phenol, the alkyl group being preferably a tertiary one. As a matter of fact, the condensation products of the character described may be prepared from a mixture of several alkylated phenols. Thus, the products of the interaction of acetylene with a mixture of a preponderant amount of p-tertiary butylphenol (about 80%) and a minor amount of xylols (about 20%) have proved to be very suitable for the purpose in question. The molecular ratio between the phenol and the acetylene is preferably 1:0.3–2.5. The condensation products of the character described can be prepared for instance in the manner described in the U. S. Patents Nos. 2,027,199 and 2,072,825 to Walter Reppe and Ernst Keyssner by causing acetylene to react upon an alkylated phenol at a temperature between about 100°–300° in the presence of organic zinc or cadmium salts and/or organic nitrogenous bases, especially amines. The conditions of working will have to be chosen in such a manner that the resulting condensation products are not wholly insoluble in organic solvents. For practical purposes they should be soluble in aromatic or aliphatic hydrocarbons. Suitable alkylated phenols are in particular butylphenol, amylphenol and isododecylphenol. These condensation products if incorporated within unvulcanized rubber impart thereto a much better adhesive capacity than it can be achieved by means of the same amount of colophony. Moreover, the mechanical properties of the resulting vulcanizates are much less affected by our new adhesive agents than by an equal amount of colophony. In consequence thereof, our invention allows one to work with a relatively high amount of adhesive agents, thus securing an excellent adhesive capacity of the rubber articles thus prepared and an excellent stability of the composite rubber articles built up therefrom, without running the risk of impairing the properties of the vulcanizates to any material extent.

The incorporation of our new adhesive agents within the rubber can be effected in various ways. Thus, they can be added to latex or to a latex-like emulsion of synthetic rubber-like materials, whereupon such latices can be used in the usual manner for instance by dipping or brushing. Furthermore, solutions of the said condensation products in organic solvents can be combined with solutions of natural or synthetic rubber, the resulting mixtures being likewise capable of being worked by dipping or brushing. In the case of emulsions as well as in the case of solutions the rubber may be provided with vulcanizing agents, vulcanization accelerators, filling agents and the like in any stage prior to working. In most cases the new adhesive agents are incorporated within the rubber by working a mixture thereof on the roller, it being preferred that the surface of the rubber sheets or layers prepared therefrom are contacted with a suitable solvent such as benzine prior to the pressing of one sheet onto another. Finally, a sufficient adhesive capacity can be brought about by spreading a solution of the said condensation products on at least one of the rubber surfaces to be duplicated. As a matter of fact, in the two latter cases the excess solvent must be evaporated prior to the building up operations.

As it follows from the foregoing paragraphs, a good binding effect can be achieved already by incorporating our adhesives within only one of the rubber sheets to be united, though in general both sheets are provided therewith. Depending on the use to which the rubber is to be put it can be provided with vulcanizing ingredients and/or filling materials or not. In the unvulcanized state, our compositions (i. e. the mixture of unvulcanized rubber and the adhesive agent) can be employed, in the form of solutions or aqueous dispersions, for the preparation of strips or

plasters which stick to each other but to no surface of any material other than rubber. In the case of vulcanizable rubber mixtures our adhesives serve to facilitate any building up operations, for instance in the preparation of tires, conveyor belts, boots, stuffings, rollers or hollow articles.

In accordance with what has been stated above our new invention can be applied to any kind of rubber. Besides natural rubber there are mentioned the various types of synthetic rubber-like materials. Examples for such products are the sodium and the emulsion polymerizates of butadiene hydrocarbons, furthermore, the polymerization products of halogenated butadienes such as 2-chlorobutadiene-1.3, and finally the products of the conjoined emulsion polymerization of butadienes with copolymerizable vinyl compounds such as styrene, acrylic ester nitrile, fumaric acid esters and the like.

The following examples illustrate the invention without restricting it thereto, the parts being by weight:

Example 1

This example illustrates the superiority of our condensation products over colophony as regards the adhesive capacity of a film of unvulcanized rubber. Into solutions of masticated natural rubber in benzene there are incorporated 20 per cent of colophony on the one hand and 20 per cent (calculated upon the rubber content) of a condensation product of the character defined below. Textile strips of a breadth of 2 cm have been spread on with these solutions so as to be covered with a uniformly thick rubber film of a smooth surface. After drying for 5 minutes these films have been duplicated. Thereupon the time has been measured within which a weight of 1000 g is sufficient to separate the composite strips for a length of 15 cm. The following table illustrates the time is seconds:

1. Natural rubber without adhesive agents	7.5
2. Natural rubber containing colophony	25
3. Natural rubber containing a product of the condensation of 1 mol of p-tertiary butylphenol and 1,3 mol of acetylene prepared in the presence of zinc naphthenate	65

These figures are given by way of examples only, it being to be understood that a similar increase in adhesive capacity is to be observed in case the natural rubber is replaced by various synthetic rubber-like materials such as polymeric 2-chlorobutadiene-1.3 or polymeric butadiene hydrocarbons.

Example 2

This example illustrates that a similar result is achieved in case the unvulcanized natural rubber is replaced by a vulcanizable mixture containing a synthetic rubber-like material. A mixture of the following composition:

	Parts
A synthetic rubber prepared by the emulsion polymerization of 70 per cent of butadiene and 30 per cent of styrene, this product having been plastified by exposing the same to an oxydizing treatment in the presence of anti-oxidants	100
Zinc oxide	24
Carbon black	7.5
Tetrahydronaphthalene	3
A brown coal tar-destillate	2
Sulfur	1.8
Benzothiazol-2-sulfendiethylamide	0.85

has been tested without any adhesive agents (test A), with the addition of 5 parts of colophony (test B) and finally with the addition of 5 parts of a product of the condensation of 1 mol of isododecylphenol and 1.5 mols of acetylene prepared in the presence of zinc isododecylphenoxy butyrate at 180° C (test C). The tests have been performed by cutting these mixtures into strips of a breadth of 2 cm, contacting these strips with benzine and, after a 5 minutes' drying, pressing two surfaces together for a length of 1.5 cm. After a 5 hours' storing the weight has been measured which is necessary for tearing apart such strips. The following table shows the tests, the right hand column illustrating the weight in kg:

A	4.2
B	5.1
C	8.3

Also in this example the said synthetic rubber-like material can be replaced by natural rubber or other synthetic rubber-like materials.

Example 3

This example serves to illustrate that a smaller amount of our condensation products than of colophony is sufficient for reaching the same degree of adhesive capacity, the tests having been performed with the vulcanizable composition which is described in the foregoing example. In test A the said mixture has been employed without any adhesive agent, in test B with the addition of 10 per cent of colophony (calculated upon the rubber content) and in test C with the addition of 2.5 per cent of the condensation product described in the foregoing example. The following table shows the tensile strength in kg, the tests having been performed as described in example 2.

A	4.2
B	6.1
C	6.0

Example 4

This example illustrates the superiority of our condensation products over colophony as regards the mechanical properties of composite vulcanized rubber articles. A composition as described in Example 2 has been vulcanized without any adhesive agents (test A), furthermore with the addition of 5 per cent of colophony (test B) and finally with the addition of 5 per cent of a product of the condensation of 1 mol of cresol and 1.3 mols of acetylene prepared in the presence of zinc acetate at 160-185° C (test C), the vulcanization having been performed by a 45 minutes' heating at 2.1 atmospheres overpressure. The following table illustrates the mechanical properties of the resulting vulcanizates, column *a* showing the tensile strength in kg per cm^2, column *b* the elongation in per cent, column *c* the permanent set in per cent and column *d* the weight at an elongation of 300 per cent:

	a	*b*	*c*	*d*
A	68	585	8	16
B	54	875	18	8
C	75	660	10	14

Example 5

This example illustrates the use of our adhesive agents in form of a solution in an organic solvent by spreading the same on the surface of the

rubber mixture to be duplicated. Textile materials covered with a film of a vulcanizable synthetic rubber mixture (see Example 2) have been cut into strips of a breadth of 2 cm and duplicated without an adhesive (test A), furthermore, with colophony (test B) and finally, with a product of the condensation of acetylene and p-tertiary butylphenol as described in Example 1, the colophony and the said condensation product having been applied to the rubber mixture in form of a 3 per cent solution in a mixture of benzine and toluol. The following table shows the time in seconds which has been measured as described in Example 1:

A	10
B	20
C	120

Instead of the said solutions of the adhesive agents there can also be employed solutions containing natural or a synthetic rubber besides the adhesive agents.

Example 6

This example illustrates the effect which is brought about by the method as described in the foregoing example after vulcanization.

Sheets of the vulcanizable synthetic rubber mixture of Example 2 are spread on with a 3 per cent solution of the product of the condensation of p-tertiary butylphenol and acetylene as described in Example 1 (test A) or with colophony (test B) in a mixture of benzine and toluol. After a 15 minutes' drying the sheets have been duplicated and vulcanized. In a third experiment (test C) the sheets have been duplicated and vulcanized under the same conditions but without adhesive agents. After vulcanization the plates have been cut into strips of the breadth of 2 cm. From an investigation of several such strips taken from different parts of the composite article there can be calculated how many per cent of the surface of one sheet adheres to the surface of the other sheet. The following table shows the result, the righ hand column illustrating the percentage:

A	100
B	50
C	0

OTTO HECHT.
HANS PRILLWITZ.
IVO DANE.

Published May 11, 1943

Serial No. 360,151

ALIEN PROPERTY CUSTODIAN

STRAIGHTENING MACHINE FOR SHEET METAL PLATES

Fritz Ungerer, Pforzheim, Germany; vested in the Alien Property Custodian

Application filed October 7, 1940

The invention relates to a machine for straightening sheet metal plates by means of straightening rolls especially destined for straightening burnished-rolled sheet metal.

At the straightening of sheet metal plates, especially aluminium plates, the inconvenience is noticed that fine metal particles are torn off the sheet metal and deposited on the straightening rolls, where they stick and more and more smear the surface. The supporting rollers revolving with the straightening rolls of the srtaightening machines of known type equipped with these supporting rollers take off from the straightening rolls some of these detached metal particles and are therefore also dirtied, but the remaining metal particles are pressed more strongly against the straightening rolls by these supporting rollers, so that the straightening rolls are finally, and often even after a few hours, no longer suitable for the straightening of sheet metal plates which arrive in the straightening machine in burnished-rolled state but must not lose the bunish in this machine. The surface of the sheet metal plates becomes duller and of mean appearance when the dirtying of the straightening rolls increases, so that the attendant of the machine must frequently carry out a thorough cleaning of all straightening rolls and of the suporting rollers, sometimes even every few hours. With this object in view the rollers must be made easily accessible in the machine or removed completely, then polished again and finally re-inserted into the position in which the straightening of the sheet metal plates can be continued. Hereby stops lasting sometimes several hours occur often several times each day, during which stops the straightening rolls and supporting rollers must be re-polished, for instance by means of finest emery cloth. If this time-wasting work is carried out when the rolls and rollers are in the machine, it may happen that emery particles and polish dirt get into the machine and not only damage the bearings but also the material to be straightened if the impurities get at these points. When the straightening rolls and supporting rollers are removed from the machine for repolishing, the time for removing and re-insertion is also lost.

In the course of time the diameters of the straightening rolls and supporting rollers further become shorter by these treatments, so that the rolls and rollers must be replaced.

These inconveniences are obviated by the invention.

The novelty consists in the arrangement of flaps, strips, plates or blocks of cloth, felt or similar material at least along that portion of the running surfaces of the straightening rolls which is used for the straightening, so that the cloth is pressed against the rolls or can be pressed on during the straightening.

It has been found that these means are sufficient to always remove immediately the deposited metal particles and to keep the rolls clean in this manner.

Additionally the supporting rolls may be kept clean by pressed-on cloth, felt or similar material.

The sheet metal plates straightened by rolls which are permanently kept clean in the manner described preserve the burnish produced by the burnished-rolling, and it is not at all necessary to freshly re-polish the rolls and rollers in the meantime.

It has further been found that the system of supporting rollers can be omitted and replaced by a supporting device which not only keeps clean the straightening rolls as said materials bear against or are pressed onto the straightening rolls, but also supports directly these rolls, it being immaterial whether these novel supporting means serve merely for a stationary supporting, by which the straightening rolls for instance remain directed accurately straight, or whether they serve for an adjustable supporting, by which a more or less strong bending of the straightening rolls towards the material to be straightened can take place.

The supposition, that the said materials might not be sufficiently yielding and wear-proof as supporting means, has not been confirmed by experiments. The capability of a hard felt block, for instance, for carrying out the necessary supporting or straightening pressure may result therefrom that at the straightening of metal- or aluminium plates not so great setting work and also not so great straightening pressure are necessary as at the straightening of plates of iron or steel. For the latter, especially for steel plates, the novel supporting means are not suitable. They are, however, especially suitable for machines, in which burnished sheet metal plates are completely straightened, detended and smoothened. This kind of sheet metal plates is already comparatively well rolled, so that often one single passage through the straightening machine is sufficient. The stretching must then also be very slight, as otherwise, owing to the alteration of the surface structure and of the displacing of the metal particles, the burnish gets lost more or less. The new supporting means

can perfectly stand the little straightening work which is thus to be effected.

Two embodiments of the invention, according to which the cleaning means for the straightening rolls is at the same time the direct supporting means for the same, are illustrated by way of example in the accompanying drawing, in which:

Fig. 1 shows in front elevation a straightening machine with supporting device according to the first embodiment of the invention,

Fig. 2 is a side elevation of Fig. 1,

Fig. 3 shows in front elevation a plate straightening machine with supporting device according to the second embodiment of the invention,

Fig. 4 is a side elevation of Fig. 3,

Fig. 5 is a top plan view of the lower set of straightening rolls with supporting device according to the second embodiment of the invention.

On the base box 1 of the plate straightening machine the uprights 2 are arranged one at each end. The bearing bodies 3 of the lower set of straightening rolls 5 and the bearing bodies 4 of the upper set of straightening rolls 6 are mounted in the uprights 2. The bearing bodies 4 of the upper set of straightening rolls 6 hang in known manner on a yoke, not shown, extending over the whole machine and adapted to be lifted and lowered by the rotating of corresponding hand wheels, and this yoke may also be inclined. The supporting of the lower set of straightening rolls 5 is effected by means of a great number of supporting beams 7 or 14, arranged closely the one at the side of the other in the direction of the length of the straightening rolls 5, said supporting beams being carried at two points by bolts 8, and the set off part 9 of said bolts is located in the adjusting rings 10 and 11 and in a bore of the base box 1. Helical faces of these adjusting rings 10 and 11 rest the one on the other so that, when the rings are mutually turned, these faces lift or lower the bolts 8 and therefore the beams 7 or 14 respectively. The supporting device in both embodiments of the invention is consequently adjustable, the lower adjusting ring 11 resting on the base box 1 being secured against turning, whereas the upper adjusting ring 10 can be slightly turned from one side of the machine by means of a system of levers not shown in the drawing. The pitch of the helical faces of the rings 10 and 11 is dimensioned so that, at a corresponding turning of the upper ring, the pitch is sufficient to effect the necessary lifting and lowering of the supporting beams 7 or 14 and therewith the desired bending of the straightening rolls 5 towards and away from the material to be straightened.

In this lifting and lowering of the upper rings 10 participate, according to the first embodiment of the invention shown in Figs. 1 and 2, strips 12 of cloth, felt or hard felt, placed one strip on each supporting ring 7 and fixed on the end face of the corresponding beam 7 by means of a clamping disc 13. The actually driven straightening rolls 5 are in this manner not only supported and, if necessary, slightly bent at certain points, but their surface is continually cleaned from the deposited metal particles which stick in the strip 12 of cloth or felt and do not longer rotate with the straightening rolls 5, as has been the case up to the present.

In the first embodiment of the invention illustrated in Fig. 2, the strip 12 of cloth or felt is located in indentations the depth of which depends on the thickness of the straightening rolls, these indentations forming undulations in the supporting beam 7 and therefore imparting to the strip 12 an undulated shape. Instead of single strips 12, which are in contact the one with the other at their edges and have a width equal to that of the supporting beam 7, plates or carpets may be placed on the beams 7 and extend over some or, if desired, over all beams 7. The elasticity, even of hard felt, is so great that, without getting damaged, it can stand the slight bendings of the felt plate occurring in the last instance at certain points of the felt plate towards or away from the material to be straightened.

According to the second embodiment of the invention a block 15 of hard felt is provided instead of the strip 12 or the plate, and in this block indentations for accommodating the straightening rolls are provided. This block 15 is not so stiff that it could not be pressed more strongly against the straightening rolls 5 at certain points than at other points.

According to the kind of sheet metal plates to be straightened, the strips 12, the carpet or block 15 will, in one or several weeks, be full of detached metal particles, so that they have to be exchanged against fresh ones. This is effected simply and quickly by lowering the beam 7 or 14 respectively, removing from the beams the dirty inserts 12 or 15 of cloth or felt, and replacing the same by fresh or cleaned inserts.

Instead of the adjusting elements 8, 3, 10. and 11 of the supporting device, any other suitable devices, for instance of hydraulic type or screw spindles, adjusting wedges, eccentrics or the like, may be used.

For the upper set of supporting rollers a supporting device, not shown in the drawing, may be provided, destined to clean the upper set of straightening rolls in a similar manner as the cleaning of the lower set of straightening rolls is carried out.

FRITZ UNGERER.

PUBLISHED — F. UNGERER — Serial No. 360,151

MAY 11, 1943. STRAIGHTENING MACHINE FOR SHEET METAL PLATES

BY A. P. C. — Filed Oct. 7, 1940

Fig. 1.

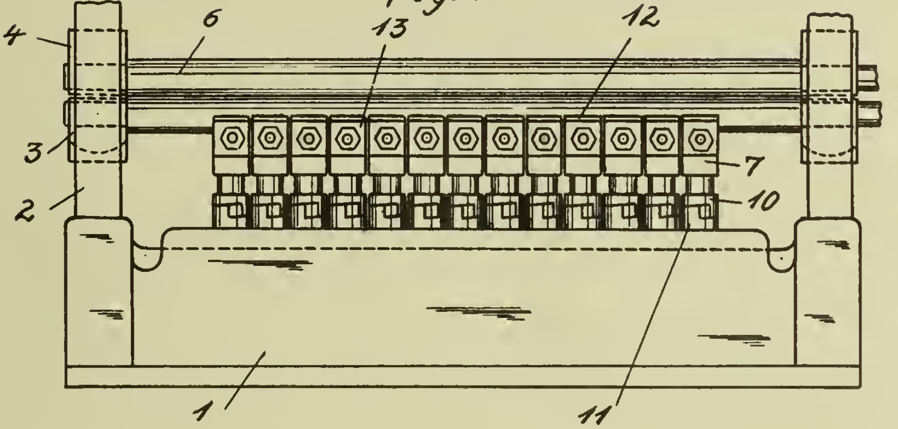


Fig. 5.

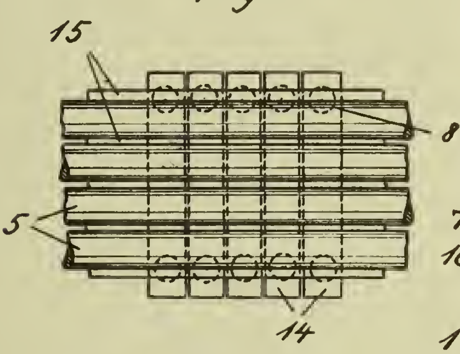


Fig. 2.

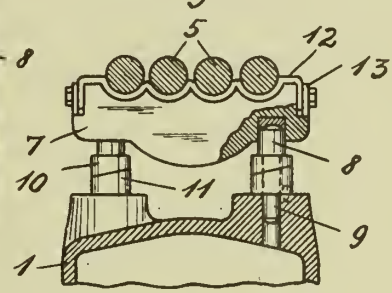


Fig. 3.

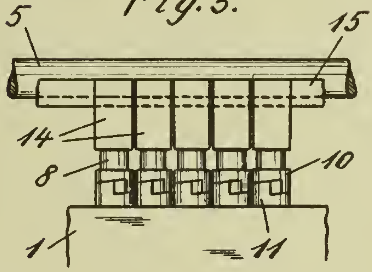
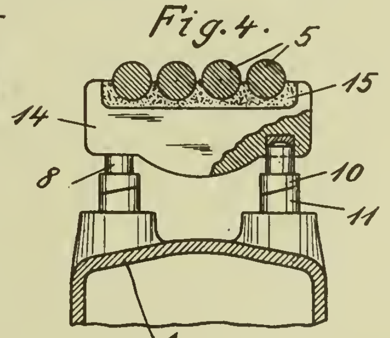


Fig. 4.



Inventor:
Fritz Ungerer
By [illegible]
his Attorney

Published May 11, 1943

Serial No. 360,204

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF MASSES AND SHAPED PIECES POSSESSING HIGH ELECTRIC, CHEMICAL, MECHANICAL AND THERMIC STRENGTH

Herbert Witzenmann, Munich, 13, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 7, 1940

This invention relates to a process for the production of masses and shaped bodies possessing high electric, chemical, mechanical and thermic strength. According to this process masses of the following composition are obtained by smelting:

	Per cent
SiO_2	30–80
MnO	4–54
MgO	0–35
Al_2O_3	0–30
CaO and/or SrO and/or BaO	0–30
WO_3	0–3
$Ca_3(PO_4)_2$	0–5

By suitably proportioning the constituents of the gob and by certain additions, which will be hereinafter explained, the masses and shaped pieces which are obtained can be influenced in different directions, according to the properties which are especially desired in each instance.

At the preparation of a dielectric of high electric insulating property, two properties have to be observed especially.

1. The mass must contain only a small percentage of alkali compounds, especially alkali oxides, or it must be free from alkali. Alkali compounds and alkali oxides affect the electric conductivity and the disruptive strength as well as the surface resistance of the masses in question in a manner which is the more unfavorable the stronger they are present in the same. Their expansion coefficients are further comparatively high, whereby in turn the constancy against change of temperature of the corresponding masses is unfavorably influenced. A high content in alkali reduces the mechanical and chemical strength of the corresponding masses.

2. At the preparation of the dielectric it is advisable to strive for the highest possible homogenity of the same. As in inhomogenous media the chief drop in voltage occurs on the constituent with the smallest dielectric constant, the drop in voltage predominates in the constituent having a low dielectric constant when the dielectric constant is high in the other constituent, especially in the air film or air bubble. Consequently glow discharge occurs here easily, which might lead to heating of the insulator and to heat disruption, and also to the releasing of voltages of the workpiece which might still exist.

The two required properties, low content in alkali and high homogenity, are, however, in a certain opposition. The alkalis as excellent flux enable in glasses the purification of the same and therefore their homogenisation, in porcelains the production of a scarf as tight as possible at normal temperatures. The same result can be obtained in masses free from alkali, if at all, only at temperatures which in practice can no longer be applied owing to the extraordinarily high cost of the products. The introduction of B_2O_3 in silicates makes it possible to do justice to both requirements (the almost complete exclusion of the alkalis and the obtention of homogenous workpieces). There are, however, serious objections against the employment of B_2O_3. If used in percentages above 5% B_2O_3 increases the lixiviation capability of the glasses. It is further known, that boron silicates of high electric and thermic strength owing to their high content in silicon are rendered much expensive not only by the comparatively high price of the boric acid but also by the technological difficulties of their preparation. Glasses of this kind melt only at high temperatures. The melting can take place only in crucibles or vats of the expensive materials capable of withstanding this stress. The difficulties which occur at the shaping and cooling are not less great. Finally, alkali compounds can practically not be completely dispensed with also in glasses of this kind.

The present invention overcomes these difficulties. It enables, which up to the present has never been the case, the preparation of masses free from alkali and boric acid at melting temperatures which approximately correspond to that of the window glass. In connection herewith it has to be pointed out that the corresponding masses can be easily worked. The modification capability of the manganese silicate is further one of its excellent properties and owing to this capability several special properties may be imparted to the same by additions of different kinds. Consequently, if desired, small quantities of alkalis or boric acid may be added to the mass. If it is desired to prepare, instead of the easily meltable mass, a difficultly meltable mass with the corresponding special properties of this modified form, it is also possible to develop masses with especially high content in silicon and alumina in the range according to the formula, said masses melting only at a temperature of over 1450°.

Before the melting the raw materials disintegrated very finely are mixed in a suitable manner, for instance in an Alsing cylinder. The mixture is molten in suitable containers at temperatures between 1250° and 1450° (with the exception of the higher melting special forms men-

tioned above). Single constituents of the mixture may also be first kept back and gradually added during the melting of the other constituents.

The components of the above mentioned gob

	Per cent
SiO_2	30–80
MnO	4–54
MgO	0–35
Al_2O_3	0–30
CaO and/or SrO and/or BaO	0–30
WO_3	0–3
$Ca_3(PO_4)_2$	0–5

may also be introduced wholly or partly in other form. The silicon (SiO_2) may be wholly or partly replaced by SiC, the manganese oxide (MnO) by MnO_2, Mn_2O_3, Mn_3O_4, $MnCO_3$, $MnCl_2$, $MnHPO_4$ or MnS, the magnesium oxide (MgO) by $Mg(AlO_2)_2$, $MgNH_4AsO_4$, $MgBr_2$, $MgCO_3$, $MgCl_2$, MgF_2, $Mg(OH)_2$, $Mg(NO_3)_2$, $Mg_2P_2O_7$, Mg_2SiO_4, $MgSiO_3$ or $MgSO_4$ the argillaceous earth (Al_2O_3) by Al_4C_3, $AlCl_3$, AlF_3, AlN, $Al(OH)_3$, $AlPO_4$, $Al_2(SO_4)_3$, Al_2S_3, the calcium oxide (CaO) by $CaBr_2$, CaC_2, $CaCO_3$, $CaCl_2$, $CaCN_2$, CaF_2, CaJ_2, $Ca(MnO_4)_2$, $Ca(NO_3)_2$, $Ca(PO_3)_2$, $CaSiO_3$, or $CaWO_4$. Further the calcium oxide or the calcium containing additions may be replaced wholly or partly by the corresponding strontium- and barium compounds. Barium is known as flux. In some gobs with high content in manganese the constituent in barium must, however, not be high, as otherwise the mass will become inhomogenous and porous. Strontium is in many instances better suited to replace the barium wholly or partly, preferably in form of strontium carbonate, strontium chloride or strontium sulphate.

To the mass known coloring substances may be added also. By addition of titanium compounds the dielectric constant can also be increased.

By addition of circonium compounds together with alumina especially the strength against hydrolytic influences and against alkalis is increased.

To the molten mass reducing agents such as tartar, tartaric acid, urea, sugar, charcoal and others, and purifying agents such as antimony, antimony sulfide, arsenic compounds and others may be added.

The masses are cooled at suitable temperatures adapted to the composition and stressing.

HERBERT WITZENMANN.

Published May 11, 1943 Serial No. 360,381

ALIEN PROPERTY CUSTODIAN

IMPLEMENTS FOR DRIVING IN SCREWS, WIRE NAILS, ETC.

Gerrit Hilgers, Rotterdam, Netherlands; vested in the Alien Property Custodian

Application filed October 9, 1940

The invention relates to implements for use in driving in screws, wire nails and the like fastening elements.

To rapidly and accurately drive in wood screws, wire nails etc. in a given position, is often found very difficult and frequently leads to injuries, caused by the screw-driven or other implement glancing off the head of the screw or nail and hitting the fingers of the operator. In many cases, moreover, where it is not possible to hold the screw in position by hand, as for instance in electrical assembling operations, even skilled artisans find it difficult to turn in the screw correctly and for this reason it has already been proposed to temporarily connect the screw to the screw-driver. It is, however, not easy, especially in the case of screws of larger sizes, to render such connection sufficiently stiff and at the same time sufficiently disengageable whilst moreover devices of this kind are not suitable for screws of widely varying sizes.

The object of my present invention is to provide an improved implement of this kind which meets the above-mentioned objections, is very handy in use, in many cases guarantees better work than hitherto possible, permits of simple and robust construction and is suitable for a great many purposes. This novel implement is characterised by a tubular holder closed at one end, with the exception of an axial opening for letting through a screw, nail or the like and being provided near this end with axially extending slits in such a manner that the screw or the like is yieldably clamped by the tongues formed by said slits and that also the head of the screw or nail, by the resiliently spreading of such tongues, may leave the holder through said axial opening.

The invention will hereinafter more fully be described with reference to the accompanying drawing showing two different embodiments.

Figure 1 shows by way of example a longitudinal sectional view of an implement according to the invention, together with screw-driver to match.

Figure 2 is an end view of the implement shown in Figure 1, seen from below.

Figure 3 is a side elevational view, seen from the right, of the implement shown in Figure 1.

Figure 4 shows a longitudinal section through a modified construction of the implement, along with a suitable striking pin.

In these Figures 1 indicates a tubular holder of which the lower portion 1^1 is slightly tapered in downward direction and provided with axially extending slits (saw cuts) 2, say four in number, such slits dividing said lower portion of the holder into four elastically yieldable tongues, the lower extremity of said tapered portion 1^1 being contracted to form a comparatively narrow axial screw outlet passage 3, the inner faces of said yieldable tongues tapering towards such outlet passage 3.

The wall of the tubular holder 1 is formed with a slot 4 through which screws, such as 5, may be introduced in the manner shown in Figure 1, i. e. with the point downwards, such screws falling down the tapering bore of the holder and being automatically guided thereby towards the outlet passage 3 into which the point of the screw enters.

At its upper end the holder 1 is closed by a flanged plug 6 comprising a threaded portion 6^1 screwed into the internally threaded upper extremity 1^2 of the holder 1 and formed with an axial bore 6^2 through which slidably passes the shaft 7 of a screw-driver, such shaft, below the screw plug 6 being provided with a tapered collar 8 serving to guide the shaft 7 within the tapered portion of the bore of the holder when the screw-driver is advanced towards the screw and also to add in spreading the yieldable tongues upon screwing down the screw into the work.

After the screw 5 has been inserted, point downwards, into the holder, through the slot 4, and has entered the outlet passage 3, the screw-driver is advanced and by carefully turning the shaft 7 of the screw-driver, the working edge 9 of the screw-driver will quickly find and enter the slot in the head of the screw so that by continued rotation and advancing the screw-driver, the screw may be readily screwed into the work upon or against which the lower end of the holder 1 is pressed. During the advance of the screw-driver the collar 8 and also the head of the screw 5 cause the spring tongues at the end of the holder to gradually spread thereby widening the passage 3 to such an extent that also the head of the screw passes through and leaves said passage upon finally screwing down the screw 5, whereupon the holder is removed from the work.

Figure 3 clearly shows the screw partly screwed into the work.

It will be understood that the screw-driver, as such, may be of different shape and construction. It may for instance be a screw-driver of the well known ratchet type or of the type comprising a brace.

It may also take the form of the known type of screwdriver operating in the manner of an

Archimedian or spiral drill. In that case it is not always necessary that the shaft proper of the screw-driver is guided within the holder. This shaft may sometimes be surrounded by a casing or shell containing the mechanism of the screw-driver in which case this shell may be guided within the holder.

By substituting a striker pin for the screw-driver, the implement according to the invention may be used for driving in wire nails and the like. This is shown in Figure 4, in which such nail is indicated at 10. The striker pin 11 is provided with a working portion 12, having a flat end face engaging the head of the nail, and with an enlarged portion 15, the lower end of which is tapered to match the taper of the lower portion of the bore of the holder. At the upper end the striker pin 11 carries a striker head 16.

Figure 4 also shows how the implement according to the invention may be combined with a magazine for screws, nails etc. This magazine is formed by a flat housing 13 open at one side and attached to the holder 1 in such a manner that this open side coincides with the opening 4 which as in the embodiment shown in Figures 1 and 3 is provided in the wall of the tubular holder 1. The back of the housing 13 is downwardly inclined towards the wall of the holder. At the top, the housing is provided with an opening 14 for inserting the fastening elements, in this case, the nails 10 in upright position, point downwards, into the magazine, the shape of the magazine being such, that the nails are held in this position as long as the opening of the magazine is opturated by the enlarged portion 15 of the striker pin 11, or of the shaft of the screw-driver as the case may be. Upon the striker-pin or screw-driver being withdrawn, so that the enlarged portion 15 clears the slot 4, a nail or screw as the case may be, slips through the slot and falls down into the lower end of the bore of the holder, so that it may be driven in, in the manner described, either by advancing the striker pin until it rests upon the head of the nail and striking the head 16 of such pin with a hammer, or by finding the slot of the screw-head with the edge of the screw-driver and turning the screw in the ordinary manner. During this operation the magazine is again closed by the enlarged portion 15.

If desired the implement may be provided with a hand-protector, for instance to be attached to, or associated with the screw plug 6, a wooden grip etc.

GERRIT HILGERS

PUBLISHED
MAY 11, 1943.
BY A. P. C.

G. HILGERS
IMPLEMENTS FOR DRIVING IN SCREWS, WIRE NAILS ETC
Filed Oct. 9, 1940

Serial No.
360,381

FIG. 1

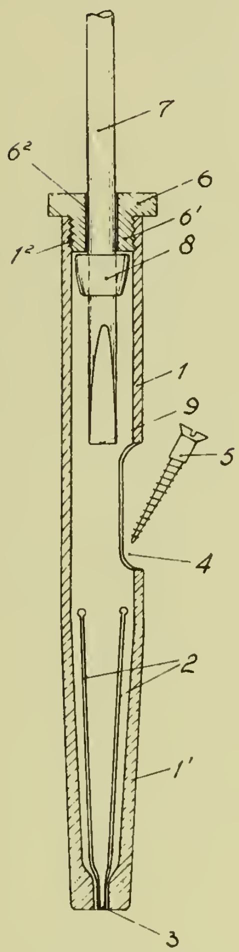


FIG. 2

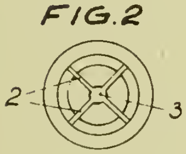


FIG. 3

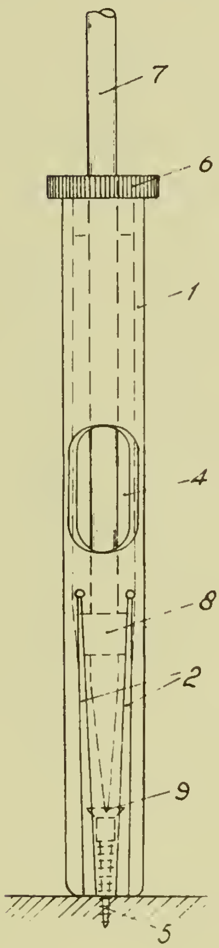
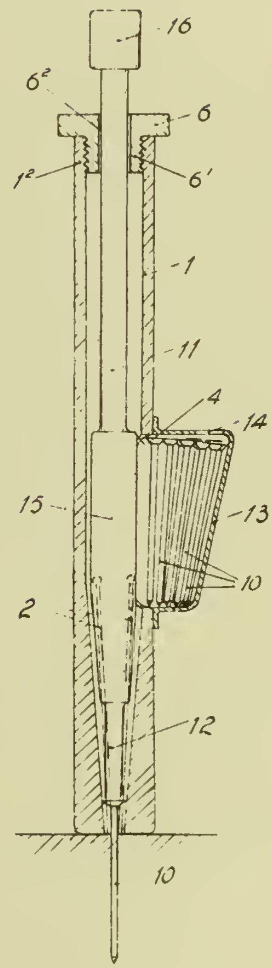


FIG. 4



Inventor:
GERRIT HILGERS
by
Attorney

Published May 11, 1943

Serial No. 360,936

ALIEN PROPERTY CUSTODIAN

PRODUCING RAILS OF HIGH RESISTANCE TO WEAR

Fritz Hofmann, Starachowice, Poland; vested in the Alien Property Custodian

No Drawing. Application filed October 12, 1940

The present invention relates to a method of producing highly wear-resistant rails.

The increase in traffic density, travelling speed and axle pressure in connection with most railroads and tramways which pressure particularly in the last 20 years had to be used to maintain competitive such means of traffic were accompanied by a permanently increasing need of rails of a high quality and of a high resistance to wear. After many failures the most various qualities of wear-resistant rails were developed.

With regard to the wear resisting property rails showing the martensite texture and compound steel rails are best. Disadvantages of the hitherto known wear-resistant rails are the large production risk and the high costs caused thereby, or even a not sufficient resistance to wear.

The great need of cheap wear-resistant rails may be gathered from the many debates which were held at International Sessions and which were directed to such rails without, however, succeeding in satisfying the hitherto existing need of a wear-resistant rail which may continuously be produced in steel plants as well as in rolling mills with the use of simple means and without special preparations and the production costs of which are low.

In summary, it could be said that the following demands should be required of wear-resistant rails:

(1) Normal production in a steel plant;

(2) Normal rolling property in a rolling mill in the same manner as with carbon steel rails;

(3) High safety against fracture, even at frost;

(4) At least a wear-resisting property sufficiently high relatively to the costs with regard to a normal carbon steel rail having a C-content of about 0,50% and 1% manganese;

(5) No essential higher costs of manufacture than occurring with the production of carbon steel rails.

Starting from these considerations the present invention relates to a rail of high resistance to wear which fully suffices the above mentioned requirements. The invention consists in using, for the production of highly wear resisting rails, an iron-manganese-silicon-base-alloy known per se and having a C-content of 0,35 to 1,0%, a Mn-content of 1,3 to 2,0% and a Si-content of 0,5 to 1,5%. After termination of the rolling operation, cooling of the finished rail, still having the rolling temperature, is effected in such a manner that a hardening texture between the sorbitic to the martensitic state occurs, whereupon, for the purpose of removing inner stresses as far as possible, cooling is retarded at a temperature of about 620° C, for instance, by embedding in sand.

The above mentioned base alloy further may contain known additions of chromium, molybdenum, vanadium and the like within normal limits.

Example

An iron-manganese-silicon-base-alloy containing 0,62% C, 1,87% Mn and 0,69% Si and normal amounts of S, P and impurities had been used to produce rails. These rails showed a tensile strength of 109,1 kg/mm^2 and an elongation of 9%.

The rails, after having been embedded in snow and subjected to frost during a whole night, were cold bent at a radius of 32,5 m and cold buckled as is usual in connection with wing-rails without a fracture being caused.

The rails were built in at places of highest traffic in a curve having a radius of 150 m at 12 o/oo slope, whereby wearing values were ascertained equal to those of the best known most expensive rails of high resistance to wear.

FRITZ HOFMANN.

[illegible]

[illegible]

[illegible]

[illegible]

Published May 11, 1943

Serial No. 361,011

ALIEN PROPERTY CUSTODIAN

PROCESS OF PREPARING COATINGS AND THE MATERIALS THUS OBTAINED

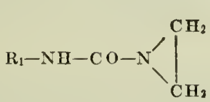
Walter Pense and Herbert Bestian, Frankfurt am Main, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 12, 1940

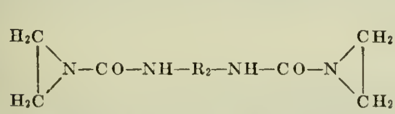
The present invention relates to a process of preparing coatings fast to water and rubbing and the materials thus obtained.

It is known that it is possible to apply on materials of fibrous structures such as leather, artificial leather pasteboard, vulcanized fiber, tightly woven fabrics and similar materials coatings from albuminous substances, for instance, albumin or casein, containing pigments or dyestuffs, softeners such as Turkey red oil and, if desired, resins such as, for instance, shellac. These coatings, however, are not fast to water and to rubbing. Their fastness properties may be improved by treating them with formaldehyde. For many purposes, however, even this improved fastness is not sufficient. Moreover, also coatings from water-soluble cellulose compounds or artificial resins, after treatment with formaldehyde, have only an incomplete fastness to water and to rubbing. A further disadvantage of this process lies in the fact that the working with aqueous formaldehyde solutions,—especially in case a spraying apparatus, much favoured in practice, is used—is very irksome on account of the penetrating smell of formaldehyde.

Now, we have found that coatings fast to water and to rubbing are obtained on materials of fibrous structure, especially leather, artificial leather, pasteboard, vulcanized fiber, tightly woven fabrics by applying coatings of albuminous substances, water-soluble cellulose compounds or water-soluble artificial resins containing, if desired, pigments, dyestuffs, softeners and resins on the said materials and treating the materials thus coated with compounds of the general formulae:

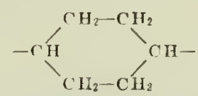


or

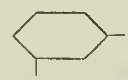


wherein R_1 and R_2 stand for aliphatic or carbocyclic radicals, or a homologue or derivative thereof.

There are particularly used compounds in which R_1 represents an aliphatic or cycloaliphatic radical of low molecular weight, for instance, the chlorethyl or cyclohexyl radical and, furthermore, compounds in which R_2 stands for a bivalent alkylene radical, for instance, the tetramethylene radical, the hexamethylene radical, the octamethylene radical or a cycloalkylene radical such as



or a phenylene radical such as



The compounds which come into question are obtained from the corresponding isocyanic or diisocyanic esters by reaction with ethylene imine. By using instead of ethylene imine propylene imine, butylene imine, dodecylene imine, phenylethylene imine or an analogous imine compound there are obtained homologues of the compounds illustrated above by formulae.

The process of the present invention is carried out by first applying in the usual manner coatings on materials of fibrous structure. There may be used albuminous substances such as egg albumin, casein, blood or water-soluble cellulose derivatives, such as methyl cellulose, hydroxyoxethylmethyl cellulose, salts of the cellulose glycolic acid obtained by reaction of cellulose sodium with chloracetic acid, or the like. The coatings may also be prepared from water-soluble artificial resins, for instance water-soluble polymerization products, especially from polyvinyl alcohol and the derivatives thereof which are still soluble in water, from salts of polymerization products containing acid groups such as sodium polyacrylate, and from interpolymers containing carboxylic acid groups such as the interpolymer from crotonic acid and vinyl acetate, furthermore, from the saponification products from interpolymers of maleic anhydride and other olefinic compounds such as styrene, vinylbutylether or the like. It is also possible to add to the coating agents which may be applied in admixture with each other colored or uncolored pigments of inorganic or organic nature as well as dyestuffs. Softening agents, resins or like substances may also be added in the usual manner.

The coatings may be applied to the material of fibrous structure, for instance leather, in one or more stages. It is also possible to apply first a so-called coating color and then a finish. After application of each of the several coats or when the coating is finished, the material is treated according to the prevent invention with the above mentioned mono- or di-urea derivatives in order

to obtain a good fixation of the coatings on the material of fibrous structure. The thus treated material is then finished as indicated more particularly in the examples.

The coatings obtainable by the present invention are distinguished by a very good fastness. For instance, a coating obtained by means of casein and hardened with formaldehyde or a substance yielding formaldehyde, such as methylolformamide, when rubbed with a moist flap will be rubbed off to a considerable extent. In case the coating is colored, the color will disappear or change its shade at places on rubbing. Contrary thereto, the coatings obtained by the after-treatment according to the present invention are entirely fast to rubbing off. Moreover, the compounds used are completely odorless whereas the working with foldmaldehyde often involves disadvantages.

The following examples illustrate the invention:

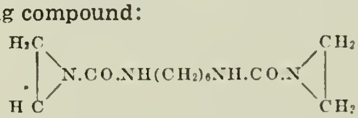
(1) A water-soluble coating for leather, that is to say a coating color, is prepared as follows:

	Grams
Casein	15
Red iron oxide	20
The dyestuff Nr. 296 (Schultz, Farbstofftabellen, 7th ed. 1931)	5
Turkey red oil (50%)	20
Ammonia (25%)	4

are ground with addition of water to form a uniform paste and finally the whole is made up with water to 1000 grams. This coating color is applied by means of a brush or a spray gun on chrome-tanned calf which has been prepared in the usual manner for finishing. If desired, several coatings of the same mixture may be applied with intermediate drying until the material is sufficiently covered. Subsequently a finish of the following composition is applied:

	Grams
Egg albumin solution (10%)	100
Casein solution (10%)	100
Fresh beef blood which has been passed through a sieve	50

made up with water to 1000 grams. Ater the drying of the coating, the leather is glazed and sprayed with a solution of 5% strength of the following compound:



The leather is again dried and ironed. The coating on the leather has a very good fastness to rubbing and to water which is essentially better than that of a coating treated with a formaldehyde solution of 10% strength.

(2) A coating for artificial leather (leather of fibrous structure) is prepared from the following mixture:

	Grams
Methyl cellulose solution (5%)	80
An aqueous solution of 15% strength of a salt of an interpolymer from styrene and maleic anhydride	20
Turkey red oil (50%)	12
Sulfonated neat's-foot oil	2
Titanium white	125

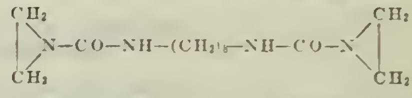
The mixture is uniformly ground to form a paste while water is added; the whole is then made up with water to 1000 grams and applied as indicated in example 1.

The following mixture is used for finishing:

	Grams
Methyl cellulose (5%)	30
A solution of 20% strength of a salt of an interpolymer from vinylbutylether and maleic anhydride	70
Turkey red oil (50%)	4
Sulfonated neat's-foot oil	½

made up with water to 1 liter.

The finished material is hardened with a solution of 5% strength of the following compound:

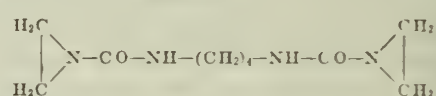


dried and glazed. If a high gloss is desired, a second coating of the same composition may be applied whereupon the material is hardened again and glazed. The coat is very fast to rubbing and to water.

(3) A colored coating to be applied on pasteboard is prepared as follows:

	Grams
Egg albumin solution of 15% strength	100
A solution of shellac and borax of 10% strength	10
Turkey red oil of 50% strength	30
A wax emulsion of 10% strength	10
The dyestuff Nr. 86 (Schultz, Farbstofftabellen, 7th ed. 1931)	8

are ground to a paste with addition of water; the whole is then made up with water to 900 grams. Shortly before use 100 grams of a solution of 5% strength of the compound



are added.

The color mixture is applied to the material by means of a brushing or dyeing machine or a spraying apparatus. In order to obtain a sufficient covering, several coatings may be applied with intermediate drying. In case an especial gloss is desired, the material may be after-treated with the following finish:

	Grams
Egg albumin solution (15%)	100
A solution of shellac and borax (10%)	10
Turkey red oil (50%)	5

made up with water to 1000 grams.

The material thus coated is sprayed with a solution of 5% strength of the compound named, dried and the pasteboard is ironed and calendered.

(4) A colorless coating fast to water and to rubbing is obtained on leather tanned with a vegetable tanning agent by applying the following mixture:

	Grams
Casein solution (10%)	50
A solution of 20% strength of a salt of an interpolymer from vinylbutylether and maleic anhydride	50

diluted with water to 750 grams.

The coating may be applied by means of a sponge, a plushboard or with the aid of a spray gun and, if desired, the application may be repeated twice or three times. After drying, the leather is glazed and sprayed with the solution mentioned in example 1. A solution of 5%

strength of cyclohexylethylene urea may also be applied.

The finish remains glossy even if it is rubbed with a dry or moist flap.

(5) A solution of 10% strength of the ammonium salt of an interpolymer from 95 parts by weight of polyvinylacetate and 5 parts by weight of crotonic acid is applied on tightly woven fabric by means of a pencil, a brush or with the aid of a spray gun. If desired, several coats may be given. After drying, the coat is sprayed with the solution mentioned in example 1.

Finally, the material is ironed or calendered; the coat is stable against the action of moisture.

(6) Vegetable-tanned calf which has been dyed in known manner according to the brushing-on method with aniline colors is finished with a coating color of the following composition:

	Grams
A solution of 5% strength of hydroxethylmethyl cellulose	100
Turkey red oil	3
Glycerol	2
The dyestuff Nr. 86 (Schultz, Farbstofftabellen, 7th ed.)	15
Water	30

Instead of a solution of hydroxethylmethylcellulose a solution of 5% strength of a salt of cellulose glycolic acid may be used.

The coating color is applied twice by means of a plush-board or a spray-gun. After drying, the coat is sprayed with the solution mentioned in example 1. Finally, the following finish is applied:

	Grams
A solution of 5% strength of hydroxethylmethylcellulose	200
Milk	50
Fresh beef blood which has been passed through a sieve	50

the whole being made up with water to 1000 grams.

After drying, the finish is glazed, ironed or calendered. The coat has a vivid shade, has a good gloss and a very good fastness to water.

(7) A coat for vulcanised fiber which is fast to water is prepared as follows:

	Grams
A solution of 10% strength of a highly viscous polyvinyl alcohol	100
Glycerol	4
Soot	7
Water	39

This mixture is applied several times on the material with the aid of a spray gun until it is sufficiently coated; it is then dried and sprayed with the solution mentioned in example 2. Finally a colorless finish of the following composition is applied:

	Grams
A solution of 10% strength of a highly viscous polyvinyl alcohol	150
A casein solution (10%)	100
Glycerol, the whole being made up with water to 1000 grams	5

After drying, the material is ironed or calendered.

(8) On colored alum-tawed goat skins the following finish is applied:

	Grams
A solution of 10% strength of sodium polyacrylate	100
Turkey red oil	5
Talcum	25
Water	170

After drying, the solution of the hardening agent mentioned in example 3 is sprayed on the material, subsequently the same finish is once more applied and, after drying, plushed.

The coat has a mild feel and a good fastness to water.

WALTER PENSE.
HERBERT BESTIAN.

Published May 11, 1943 Serial No. 361,329

ALIEN PROPERTY CUSTODIAN

PROCESS OF PRODUCING SULPHUROUS POWDERS

Herbert Fiedler, Leipzig, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 15, 1940

The invention relates to a process of producing sulphurous powders distinguished by a particular deep action. It is known that powders containing sulphur are excellently suitable for many purposes, for example for cosmetic purposes or also for dermatopathic purposes, as for example for treating comedones, acne, folloculitis. The sulphur powders employed for this purpose, usually contain the sulphur as an admixed constituent in inorganic form, and therefore the action of these powders is limited, since primary sulphur in crystalline or colloidal form cannot penetrate the adipose epiderm.

Other powders containing sulphur are known in which the sulphur is present as an organic water-soluble sulphur compound, but these powders too are not satisfactory, since the water-soluble sulphur compounds are likewise uncapable of penetrating the adipose epiderm.

According to the invention, it is proposed to produce a sulphurous powder by incorporating sulphurous conversion products of cholesterines or compounds or substances containing cholesterines, such as wool fat, wool wax, or the like, i. e. fat-soluble sulphur compounds capable of readily penetrating the epiderm, such a powder being distinguished by a particular deep action.

The powder is produced by thoroughly triturating or grinding the usual powder constituents, such as talcum, starch, bolus alba, etc., with the sulphurous conversion products of cholesterines etc. mentioned above, so that the individual particle is provided with an exceedingly thin coating of these sulphur compounds.

Such compounds can be produced by heating cholesterines or mixtures of substances containing cholesterines, such as wool fat or wool wax, with sulphur or substances giving off sulphur, in which it is preferable to employ solvents or diluents, such as alcohol, gasoline, benzene, glycerine, and the like, and to use higher reaction temperatures (200 to 220 degrees Celsius.)

The fat-soluble products, produced in this reaction, which are distinguished by their deep action, and especially distinguished by an approximately 50% higher iodine valency and a particularly pronounced reducing and oxidizing capacity, whose chemical nature could not be ascertained so far, may be termed as particularly valuable, since the especially favourable action of the sulphur is combined with the skin-nourishing properties of the cholesterines.

Now, if powder particles, which may be provided in known manner and by suitable mixing methods with an exceedingly thin fat coating, are mixed with the cholesterine-sulphur compounds by thorough trituration, if necessary in heat, the powder constituents are surrounded by a correspondingly thin coating which, when the powder is applied to the skin, slightly rubbing or massaging, is immediately absorbed by the skin.

As the sulphur compounds mentioned above have a fatty nature, a resorption by the body is not likely, since fatty products are scarcely or not at all capable of mixing with the serous liquid of the lymphatic ducts in the acanthous layer (rete Malpighi). The deep acting organic sulphur, which owing to its properties may be termed as biologically active and which in the present case is communicated to the skin by means of the powder in a particularly fine distribution, after having entered to certain depth of the skin, can therefore only become effective in this place, which ascertainment is of special importance in view of the purpose to be served in the skin by the sulphur.

Example 1

400 g of wool wax containing principally cholesterines are mixed in heat with
100 g of precipitated sulphur. To this are added
300 g of glycerine.

Then, the entire substance is heated on a sand bath to 210 degrees C. while being constantly stirred. The temperature is kept constant for ½ hour, whereupon the substance is left to cool while being stirred. The cold substance is taken up with carbon tetrachloride and the solution is filtrated off the not solved or not combined sulphur. The resulting product (yield 420 g) contains 11.7% of sulphur, partly solved and partly combined.

Example 2

6.7 g of isocholesterine are mixed, as stated in example 1, with
2.1 g of sulphur and
40 g of glycerine

and heated and left to cool. When cold, the substance is taken up with ether and the solution is filtered off. After the residue obtained (7.7 g) has dried, there remains a resinous glass-clear solid substance containing 12.4% of sulphur.

HERBERT FIEDLER.

Published May 11, 1943 Serial No. 361,463

ALIEN PROPERTY CUSTODIAN

DEVICE FOR VARYING THE STABILITY OF MARINE CRAFT

Carl von den Steinen, Hamburg, Germany; vested in the Alien Property Custodian

Application filed October 16, 1940

The invention relates to a device for influencing—particularly for reducing—the initial stability of marine craft. The initial stability of a ship being designed to withstand the most unfavorable meterological and nautical conditions is not suited for medium or smooth seas, as the motions of the ship according to the respective conditions of resonance may be unpleasantly felt, for the greater the initial stability, i. e. the greater the metacentric height of the ship, the shorter is the period of the ship's own (rolling) motions and hence, the shorter, sharper and harder are they felt to be. It is therefore the endeavor of ship's constructors to find a device by which the values of the initial stability and therefore the rolling period of the vessel may be influenced.

It is already known that the initial stability of ships may be reduced by means of freely movable liquid masses. Tanks used for this purpose are called stability reducing tanks (Labilitätstanks). As soon, however, as a vessel provided with such partly filled tanks starts to roll, the liquid in the tanks starts rolling likewise. This results in a relative displacement of the phases of the ship's motions and of the motions of the tank water which in a state of resonance reach the amount of 90°; such a tank operates "dynamically." It has thus changed its properties and becomes a Frahm "rolling tank." In order to meet this emergency it has been proposed to provide dampening partitions in the tank, but through the dampening the effect is correspondingly reduced, while in spite of the dampening a certain phase displacement remains. Such a tank therefore only represents a part solution, which, in consequence of its uncertain phase in case of disturbances, may be connected with unpleasant surprises.

According to other proposals devices operated either manually or automatically are provided for synchronizing the motional phases of the liquid and of the rolling of the ship. In these proposals the rolling of the ship is referred to the vertical (true vertical) relative to which the vertical axis of the vessel assumes different oblique positions (rolling angle). The synchronization of the phases according to this reference system cannot lead to a favorable solution because the system is based on conditions prevailing only when the vessel is artificially set rolling in a calm sea and at a horizontal water surface. In the open sea, however, when the waves act on the ship's body the conditions are essentially different.

The present invention particularly aims at improving the so-called stability reducing tanks in the sense referred to. It is based on the following perceptions. Be it assumed that two pendulums with great momentum are suspended on an axle which is fixed in relation to the ship's body and runs in something like the longitudinal direction of the vessel. One of said pendulums is freely movable while the other is continuously urged to adjust itself in the direction of the apparent vertical, i. e. in the direction which is the resultant of all forces of acceleration acting on the ship. The apparent vertical pendulum suspended on the fixed axle will in the following be termed the operative apparent vertical, because its mass is moved relative to the ship contrary to the non-operative apparent vertical, the mass of which is latent while the point of suspension moves on a circular arc which is removed from the center of oscillation of the pendulum by the length of the reduced pendulum. A well-balanced freely swinging pendulum serves to dampen the rolling movement, i. e. it has a stabilizing effect. The center of gravity of the liquid masses of a Frahm "anti-rolling" tank moves in accordance with the mass of the freely swinging pendulum. Thus the Frahm anti-rolling tank and the freely swinging pendulum are equivalent swinging systems. The operative apparent vertical pendulum with a great momentum is based on quite a different principle. Such a pendulum counteracts the stability, i. e. it reduces the initial stability of the vessel, as its mass, though actually far below the suspension point yet acts as if arranged at the suspension point itself.

Hence according to the invention one or several operative apparent vertical pendulums having a great pendulous momentum or pendulous mass systems equivalent to the apparent vertical pendulum are provided, or, alternatively, pendulous power systems acting on the vessel, the reactionary forces of said power systems being equivalent to the pendulous system referred to.

Any moved mass may be regarded as an equivalent system to the apparent vertical pendulum provided said mass is moved in accordance with the movement of the apparent vertical pendulum, i. e. that the velocity of the movement of the center of gravity is phaselessly proportional to the angular velocity of the apparent vertical. Such a system may also be characterized as having a fictitious point of suspension whose line of communication with the center of gravity of the masses must always run in the direction of the

straight line of the apparent vertical. A system in which a suitable "point of suspension" of a movable mass has been found which together with the center of gravity determines a straight line running in the direction of the apparent vertical, is the equivalent of the operative apparent vertical pendulum system. Such a system more particularly is one in which a mass of constant geometrical form moves rhythmically along a straight line lying transverse to the longitudinal axis of the ship.

Another equivalent system to the apparent vertical pendulous system consists in an activated rolling tank in which the movement of the liquid is controlled in a certain manner and in such a way that the center of gravity of the liquid masses executes the movement of an apparent vertical pendulum. Thus the pendulum must move in such a way that the line of communication of the center of gravity with a certain predetermined fictitious suspension point (tank water metacenter) points in the direction of the apparent vertical.

A tank system equivalent to the operative apparent vertical pendulum is in the following described as a static tank in distinction from the dynamic tank which is equivalent to a freely swinging pendulum and in which the center of gravity of the liquid therefore moves in the same manner as the freely swinging pendulum. It now becomes apparent why as already mentioned the solution by means of stability reducing tanks with dampening partitions only represents a part solution, as such dampened tanks correspond to a dampened freely swinging pendulum. Such a tank therefore is something between a dynamic and a static tank whilst in accordance with the invention only static tanks can serve to successfully reduce the initial stability.

It follows from the foregoing that any anti-rolling tank serving for stabilizing purposes on account of the freely movable liquid masses swinging about the longitudinal axis of the vessel may be used as stability reducing tank by suitably controlling the liquid movement in dependence on the movements of an apparent vertical. In such a controlling arrangement particular care must be taken that the liquid movement is in entire synchronism with the velocity of the apparent vertical so that both movements always simultaneously pass the zero position determined by the vertical axis of the ship. Such control may be effected by means of an apparent vertical.

In addition the amplitude of the liquid movement may be influenced in such manner that the tank may act like an operative apparent vertical at any amplitude; the stability reducing effect however depends on the amplitude, as it increases with an increasing amplitude. With a view to defining the amplitude control, reference is had to the effective tank water level. This level is characterized by the line of communication between the two centers of gravity of the liquid levels in the two tanks or by the vertical to this line of communication which is at the same time vertical to the longitudinal axis of the ship. The angle formed by this vertical with the vertical axis of the ship may be designated by ψ and the angle formed by an apparent vertical pendulum—for instance a non-operative one—swinging in a plane vertical to the ship's longitudinal axis, and the ship's vertical axis being designated by φ. Now the tank is an operative apparent vertical pendulum if

$$\psi = k.\varphi$$

in which k stands for a positive constant. This equation is so characteristic that it might define a pendulous mass system equivalent to an operative apparent vertical pendulum instead of introducing a fictitional suspension point. In order to maintain the proportionality between φ and ψ the tank is also activated in response to the amplitude of an apparent vertical as controlling element, as the constant k is also determined by the ratio between the apparent vertical amplitude and the tank water amplitude. A mode of control permitting also the variation of the constant k may be termed transmission control. By means of such control it is possible to influence the amplitude, or, what amounts to the same, the velocity of the tank water movement in order to suitably adjust the amount of reduction of the initial stability.

The case of $k=1$ deserves particular attention. Here the effective tank water level always swings with the apparent vertical horizon. At this so-called normal transmission the tank water level (the line of communication between the centers of gravity of the tank water levels in the two tanks) will adjust itself parallel to the effective wave slope, i. e. in the apparent vertical horizon. As in such a case only a pump will be required for moving the tank water, said pump overcoming the friction between the liquid and the tank walls, particularly in the overflow channel, and the inertia of the tank water relative to the horizon, only a feeble force will be required. No actual action of lifting quantities of water or the like is required in this connection. This will be necessary, however, if the effectiveness is to be enhanced or weakened by artificially decreasing or increasing the amplitude of motion (variation of the transmission ratio). In this case the control is likewise effected with reference to an apparent vertical, while a different proportional constant between the apparent vertical and the velocity of the tank water movement is obtained as compared with the normal transmission.

In the following a more detailed description is given of the subject matter of the invention with reference to the drawing representing a cross section of a ship's body.

The embodiment shows a stability reducing tank according to the invention. The tank is U-shaped and consists mainly of two legs 1 and 1', respectively, connected by a water overflow channel and an air overflow channel 2, 2', respectively. A propeller serves to regulate the movement of the liquid in the tank, said propeller being driven by an electric motor 6; 13 denotes an apparent vertical pendulum already known, which is suspended with the axis 15 at an adjusting segment 14.

The pendulum can only move within narrow limits relative to the segment 14, it being restricted by stops 19 and 20. The adjusting segment, which is toothed at its periphery, is turnable by means of a worm wheel 14' about an axis 15' running parallel to the axis 15 and being about level with the swinging center of the pendulum 13. The worm wheel is driven by an electro-motor 18, the current circuit of which is directed and closed by means of the contacts 19 and 20 via the pendulum 13 in such manner that the motor adjusts the segment in such a way that the pendulum 13 is freely suspended between the contacts in the direction of the gravitational force. To the readjusting apparatus 14 there is connected a ratio slide 26 with two levers

16 and 17. The movement of the segment 14 is transmitted to this slide and in turn imparted to a calculating device 7 which derives from the impulse received from the apparent vertical a controlling impulse for the correct control of the tank propeller. The latter has to operate at an angular velocity proportional to the angular velocity of the worm wheel axle 14'. The controlling impulse is conducted to a jet pipe relay—well known per se—via the conduits 11, 12, said relay displacing a tap in the resistance 10 in the circuit of the motor 6. If the calculating device is suitably constructed, the motor 6 by means of the pump (propeller) 4 sets the tank liquid into the desired motion. The calculating device 7 is primarily designed to establish synchronism between the movements derived from the apparent vertical and the movements of the tank water and especially to maintain such synchronism even in the face of variations of transmission. It may in addition serve to suitably utilize the amplitude of the apparent vertical movement for the control of the tank water. This latter may also be achieved by means of the ratio slide 26 which effects a variable transmission between the apparent vertical and the jet pipe relay. Thus, the amplitude of the apparent vertical movement may be likewise utilized by displacement of the ratio slide. Instead of the jet pipe relay any kind of relay may of course be used.

In accordance with the invention the control of the tank liquid in dependence on the amplitude of the apparent vertical may also be restricted to a certain angular range to be adjusted according to the circumstances. In this instance the ship's stability is reduced only until its movements exceed the apparent vertical rolling angle. When the latter is the case the tank switches itself off automatically. Now if the weather conditions or the loading conditions of the ship should call for an increase even of the initial stability, it is possible either over the whole angular range or beginning from a certain set predetermined rolling angle, by means of the ratio slide 26 to cause the tank water to swing synchronously in opposition to the wave slope. Accordingly the constant k becomes a negative value. Through this swinging motion the effective center of gravity of the ship is lowered whereby the effectiveness of the initial stability is enhanced. Finally a quick closing valve, manually or automatically operated may be arranged in one of the overflow channels for switching off the tank, i. e. for rendering it inoperative. Such a valve, which may also be termed an "emergency brake," is indicated in the drawing by the numeral 5. Although here the increase of the initial stability of the ship is only considered in connection with the stability reducing device, it may represent an important feature in itself.

Instead of an ordinary tank one may use a tank consisting of two separate containers located in the bow and stern, respectively, each of such containers communicating with the water via orifices in the ship's hull. A stability reducing effect may likewise be obtained by such tanks by alternate flooding and draining, provided this is done in a certain dependence on the apparent vertical movements.

Finally, pendulous power systems may be provided for acting upon the vessel which do not themselves refer to swinging masses but the reactionary forces of which are equivalent to those of the mass systems controlled according to the apparent vertical. To this category belong aperiodic jet pressure stabilizers operating with reactionary jet pressure as for instance externally attached Voith-Schneider propellers as already proposed for overcoming rolling movements. Such systems will also be controllable in dependence on the angle of the apparent vertical relative to the vertical axis of the ship.

CARL VON DEN STEINEN.

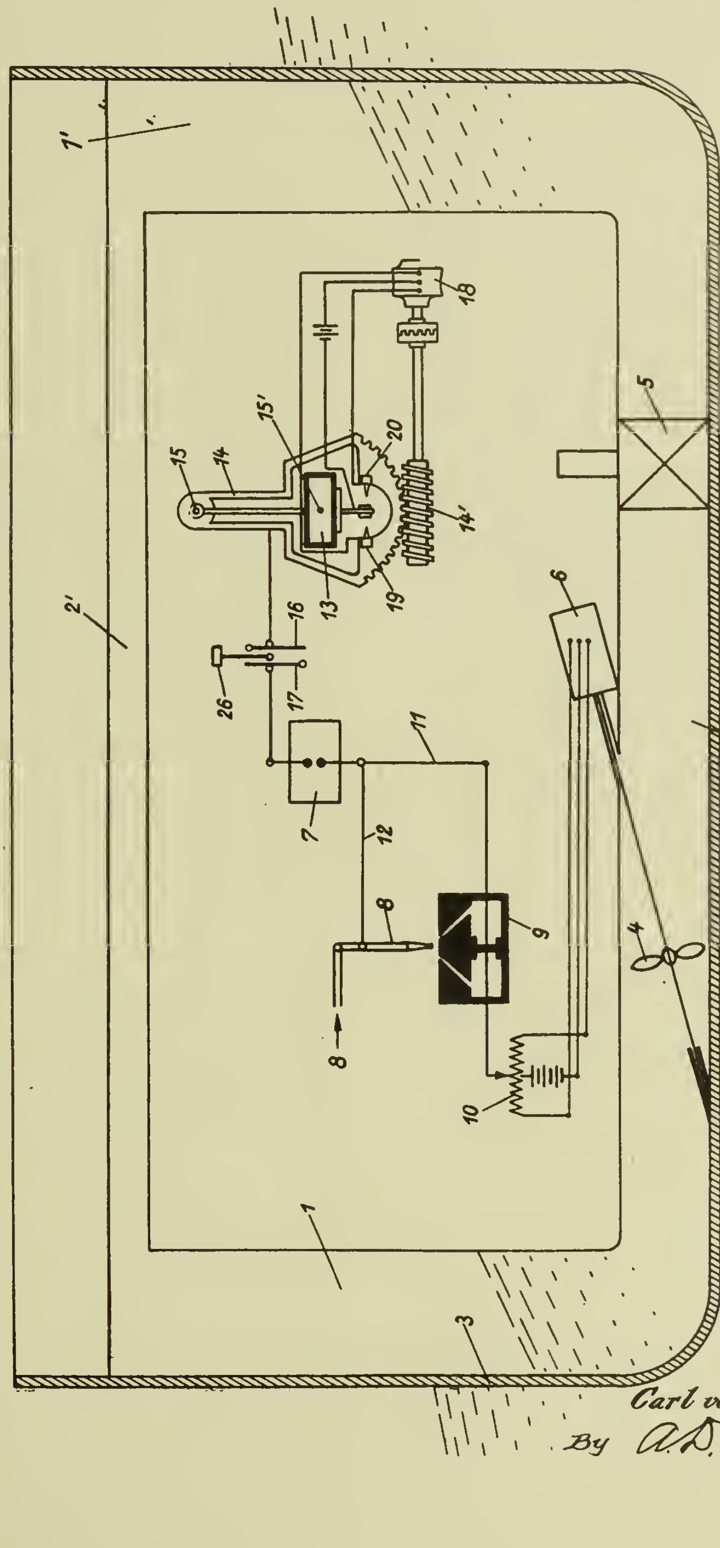
PUBLISHED

MAY 11, 1943.

BY A. P. C.

C. VON DEN STEINEN
DEVICE FOR VARYING THE STABILITY
OF MARINE CRAFT
Filed Oct. 16, 1940

Serial No.
361,463



Inventor:

Carl von den Steinen

By A. D. Adams
Attorney

Published May 11, 1943

Serial No. 362,519½

ALIEN PROPERTY CUSTODIAN

PRESSES

Wilhelm Schmitt, Goppingen, Germany; vested in the Alien Property Custodian

Application filed October 24, 1940

My invention relates to improvements in presses such as metal working presses, and more particularly in presses of the type comprising a frame, a blank holder, a slide or ram movable on the said frame for exerting pressure on a blank placed on said holder, positive driving mechanism such as a crank or cam for moving said slide or ram, and a fluid pressure cushioning device interposed between said positive driving mechanism and slide. As is known in the art the objects of such cushioning devices are, first, to permit the pressure transmitted to the slide or ram to be varied, and, second, to prevent excessive pressure to be exerted when the slide or ram meets an accidental obstruction or the resistance rises for other reasons. The driving mechanism is constructed so as to be capable of a certain movement relatively to the slide after the slide has engaged the blank for exerting pressure. This construction acts as a safety device preventing destruction of the press or its driving mechanism by excessive pressure. Further it is valuable in such presses in which the slide remains under pressure for a certain length of time after it has arrived at the end of its working stroke. In such presses the operation of the driving mechanism can not easily be interrupted exactly in the end position of the slide, and by providing the cushioning device the driving mechanism may continue its working stroke after the slide has arrived at the end of its working stroke.

One of the objects of the improvements is to provide a pressure-fluid cushioning device which may be operated by fluid under comparatively low pressure such as is ordinarily at hand in the work shop, and with this object in view my invention consists in associating a pressure increasing device with the said cushioning device which has a supply of a fluid of comparatively low pressure, and which is adapted to build up high pressure within the cushioning device.

Another object of the improvements is to provide a cushioning device in which the fluid is normally under low pressure, and the said pressure is immediately increased so far as is needed for transmitting the power from the driving mechanism to the slide, when the slide engages the blank.

Another object of the improvements is to provide a cushioning device in which the fluid pressure is automatically released when it rises to an upper limit, and with this object in view my invention consists in providing a safety valve in connection with the cushioning device which is adapted to be opened by the said pressure transmitting device, the pressure fluid being preferably conducted into a storage tank from which it may be returned into the cushioning device.

In a press in which a plurality of driving members and cushioning devices are associated with the slide I provide pressure transmitting and cushioning devices for each driving member, all the cushioning devices being connected with the same storage tank.

Other objects of the improvements will appear from the following description.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawings in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawings,

Fig. 1 is an elevation showing a press,

Fig. 2 is an elevation partly in section and on an enlarged scale showing the reciprocating slide and the cushioning device associated therewith,

Fig. 3 is a rear elevation of the said slide, and

Fig. 4 is a top plan view of the slide.

For the purpose of explaining the invention I shall describe the same as embodied in a press used for stamping or shaping sheet metal, and more particularly in the slide forming a part of the blank holder. But I wish it to be understood that my invention is not limited to the embodiment in the press shown in the drawings, and that it may be used in presses of any type. As is known in the art, the driving mechanism for the said slide can not be adjusted with such accuracy that its operating members arrive in the lower dead center when the slide is in position for holding the blank, and the said driving mechanism will be arrested either before or after its lower dead center. If the driving mechanism is rigidly connected with the slide or blank holder, the blank is correctly clamped in position only when the blank holder is arrested exactly in the lower dead center of the driving mechanism. If, however, the blank holder is in position for engaging the blank before or after the driving mechanism has passed its lower dead center, the blank is not rigidly held in position and therefore it is crumpled during the drawing operation. Further, the parts of the machine are endangered by excessive pressure. For this purpose cushioning means have been provided in connection with the blank holder, so that it is not necessary to throw the driving mechanism out of operation exactly in the lower dead center.

Referring now to Fig. 1, the frame of the press comprises a bed **70**, uprights **71** and a head **72**. On the bed **70** a bolster plate **73** is mounted, and in guide ways **74** a slide **76** is mounted, which, as shown, cooperates with a blank holder placed on the bed or bolster plate for gripping the blank of sheet metal. The slide **76** is in the form of a rectangular frame as will be described hereinafter and internally it is provided with guide ways in which a ram or punch has reciprocating movement. This ram or punch and the die

placed on the bolster plate do not form a part of my invention and therefore I have not illustrated the same in the drawings.

The slide 76 is adapted to be reciprocated by crank mechanism mounted in the head and engaging the slide at four points 10, 11, 12 and 13. The said crank mechanism comprises a motor 77, a belt gearing 78, and gear wheels 79, 80, 81 and 82, two gear wheels 82 being fixed to two shafts 83. On the said shafts 83 eccentrics 84 are mounted which are operatively connected with four rods 85 slidable in bearings 86 mounted on the head 72.

The slide 76 consists of four side members 2, 3, 4 and 5 cast integral, and the side members 3 and 5 are provided externally with guide members 6 and 7 by means of which the slide is guided in the uprights 71. Internally the frame members 3 and 5 are provided with guide members 8 and 9 in which the ram is guided.

For transmitting the reciprocating movement of the crank mechanism to the slide 76 four liquid pressure cushioning members have been provided which are similar in construction and only one of which has been shown in detail in Fig. 2. As shown in the said figure the said cushioning member comprises a cylinder 24 cast integral with the side member 2 of the slide 76 and a piston or plunger 19 reciprocating therein. The said plunger is formed with a tubular extension 18 which is engaged by a screw-threaded rod 14, the said rod being adjustably fixed in position within the tubular extension 18 by means of nuts 20 and 21. It will be understood that four rods 14 are provided which are fixed to the rods 85. The plunger 19 is formed with a collar 61 forming a shoulder 59, and within the cylinder 24 there is a sleeve 60 which is held in position by means of screws (not shown). The lower end 64 of the plunger is provided with packing material 65 held in position by means of a ring 25. By the said sleeve 60 and collar 61 the reciprocating movement of the plunger within the cylinder is limited, the extent of the reciprocating movement being indicated in Fig. 2 by the letter *a*.

To the bottom part of the cylinder 24 located between the ring 25 and the bottom 26 of the cylinder a suitable liquid under low pressure is supplied through a pipe 27 which is connected with a storage tank 29 fixed to the member 2, a check valve 28 being provided between the said tank and the cylinder permitting the flow of the liquid from the said tank to the cylinder and preventing the back flow of the said liquid.

The cylinder is connected with a device 32 for building up pressure within the liquid supplied thereto, and the said device consists of two cylinders 34 and 15 of different diameters cast integral with each other, and having pistons 36 and 37 reciprocating therein, the said pistons being rigidly connected with each other by a piston rod 35 formed with a collar 38 adapted to be seated on the wall 39 of the cylinders 34 and 15 for limiting the downward movement of the pistons. The bottom part of the cylinder 15 is connected with the pipe 27 by a branch pipe 30, and the upper cylinder 34 is connected with a suitable elastic low pressure fluid supply through a pipe 40, the said pipe including a reducing valve 41, a two-way cock 42 and a pressure gage 43, so that the fluid pressure acting on the piston 36 may be adjusted as desired by means of the reducing valve 41. While the collar 38 bears on the wall 39 no pressure is exerted by the piston 37 on the liquid within the pipes 27, 30 and the cylinder 24, and therefore there is only low liquid pressure within the said parts which is equal to the low pressure within the tank 29. To the tank 29 the liquid is supplied through a pipe 57 from a suitable low pressure liquid supply provided in the work shop.

The pipe 27 is connected by a pipe 31 with a safety valve 33 the stem of which is connected by a pivotally mounted lever 49 and a connecting rod 48 with an electromagnet 47 which, as shown, is fixed to the wall of the cylinder 34. The safety valve normally closes a pipe 50, 51 connected with the tank 29 and permitting, when open, the escape of the pressure liquid from the cylinder 24 and the pipe 27 to the tank 29.

To the piston 36 a rod 44 is fixed which carries an operating member 45 in position for acting on a switch 46, the said switch being electrically connected with a source of electric energy and the electromagnet 47.

Similar means, viz. the cylinder 24 and its piston 19, the cylinders 34, 15 and their pistons 36 and 37, and a safety valve 33 and its electromagnet 47 are provided at the right hand side of the member 2 of the slide in connection with the part 13 thereof, and the same reference characters have been used to indicate corresponding parts. However, the controlling switch 45, 46 may be dispensed with, and it has been shown only in connection with the cylinder 34, 15 and the pistons 36, 37 shown at the left hand side of Fig. 2, and the pipe 51 connected with the safety valve 33 through the branch pipe 50 communicates with the same tank 29.

In connection with the rear parts 11 and 12 of the slide rods 14, connecting members 18, plungers 19 and cylinders 24, and also devices 32 for building up pressure have been provided, as is shown in Figs. 3 and 4. The said parts are connected with the pipe 51. These devices and associated parts are alike in structure at both sides of the member 4, and the same letters of reference have been used to indicate corresponding parts, so that only one of the sets of devices need be described.

The pipe 51 is connected with a safety valve 52 which is controlled by one of the electromagnets 47. Further, it is connected by a branch pipe 53 including a check valve 54 and by a pipe 55 to the cylinders 15 and 24. It appears therefore, that at the rear side of the slide shown in Fig. 3 the cylinder 24, the device 34, 15 for building up pressure and the safety valve 33 are connected through the pressure pipe 55 with the check valve 54, and further, the safety valve 23 is connected through the pressure pipe 51 with the storage tank 29 located at the front side of the press.

The storage tank 29 has a supply of a suitable low pressure liquid such for example as oil, and its object is to supply any liquid to the pipes 27, 30, 31, 50, 51, 53, and 55 and the cylinders and valves connected therewith, which may be lost by leakage or otherwise in the course of the operation of the press, and further, the said tank is adapted to take up any liquid which may be pressed from the cylinders 24 through the pipe 51.

The storage tank 29 and the devices 32 are provided with safety valves 57 and 58.

The operation of the slide is as follows:

The cylinders 24 are filled with low pressure liquid from the tank 29 respectively through the check valves 28, the pipes 27, the check valves 54 and the pipes 51 and 55. Low pressure fluid is supplied to the cylinders 34 through the supply

pipes 40. While the slide 76 is in retracted position and no pressure is exerted thereby on the blank holder, the pressure within the cylinders 24 is small, the pistons 36 and 37 being relieved of the pressure within the cylinders 34 by the collar 38 being seated on the wall 39. The plunger 19 is in the position shown in Fig. 2, in which the shoulder 59 of the collar 61 engages the sleeve 60. The same conditions are maintained while the slide descends, and afterwards while it is moved upwardly by the crank mechanism, the said slide being positively retracted by the collar 61 engaging the sleeve 60.

At the end of the downward stroke the slide 76 bears on the blank and presses the same on the blank holder.

The spindles 14 have been set in the connecting members 18 so that after engaging the blank slide 76 continues its downward stroke a slight distance of say 1 or 2 millimeters. Thereby pressure is built up within the liquid contained in the cylinders 24, because the said liquid can not escape into the tank 29 by reason of the check valves 28 and 54, and the pistons 37 are pressed downwardly by the fluid pressure within the cylinders 34. While this fluid pressure is small it is transformed into high pressure within the cylinders 15 when the reaction of the blank holder on the slide 76 is transmitted through the liquid within the cylinders 24 and to the cylinders 15, and the collar 38 is raised from its seat on the wall 39. The pressure within the cylinders 34 is set by means of the reducing valves 41 so that, considering the diameters of the pistons 36, 37 and 19, the pressure within the cylinders 24 and on the plungers 19 is equal to the pressure to be exerted by the rods 14 on the blank. However, this high pressure is built up only when the slide 76 exerts pressure on the blank and the plungers 19 are moved downwardly within the cylinders 24, because only by such downward movement of the plungers the pistons 37 and 36 are elevated with the collars 38 away from the walls 39. While by the upward movement of the pistons 36 within the cylinders 34 the pressure of the fluid within the said cylinders and therefore the pressure built up within the cylinders 24 is slightly increased, yet this increase of pressure is practically small and immaterial, by reason of the large height of the column of fluid within the cyliners 34 and the pipes 40.

While the slide is thus in clamping engagement with the blank the driving mechanisms and the plungers continue their downward stroke through a distance of 1 or 2 millimeters and thereafter they are arrested, while the ram performs its drawing stroke and is retracted from the blank. Now the spindles 14 are retracted and they carry along the plunger 19, which first engages the sleeve 60 with its collar 61 and thereafter is positively moved upwardly. Thereby the pressure within the cylinders 24 and 15 falls off to the low pressure of the liquid within the storage tank 29, the collar 38 engaging the wall 39 and relieving the pressure of the piston 36 on the liquid within the cylinders 24.

If in the course of the downward stroke the slide 76 meets a high resistance, for example by reason of a tool being accidentally left on the blank holder or two blanks being placed on the said blank holder, the slide 76 is prematurely arrested, and the plungers 19 are forced downwardly by the driving mechanism more than 1 or 2 millimeters and so far that by the liquid expelled from the cylinder 24 the pistons 36 and 37 are forced upwardly to such an extent that the part 45 operates the switch 46. Thereby all the electromagnets 47 are energized, and the safety valves 39 and 52 are opened by means of the rods 48 and the levers 49. Therefore the liquid within the pipes 27, 30, 31, 51 and 55 and within the cylinders 24 and 15 partly escapes through the pipes 50 and 51, and it is returned into the storage tank 29. The pistons 36 are pressed with the collars 38 on the walls 39, so that the fluid pressure within the cylinders 34 is not transmitted anymore to the liquid within the pipes 27, 30, 31 and 55. Therefore, even if the driving mechanism and the pistons 19 continue their downward movement, the pressure within the said pipes does not exceed the pressure within the storage tank, and the liquid is further expelled from the cylinders 24 and into the storage tank. Thus injury to the driving mechanism or other parts of the press is avoided.

When the driving mechanism and the spindles 14 are moved upwardly the plungers 19 are first lifted within the cylinders 24 with the collars 61 into engagement with the sleeves 60, and during such relative upward movement they draw liquid from the storage tank 29, so that the cylinders 24 and 15 are again filled with low pressure liquid. In the meantime the safety valves 33, 52 remain in open position, and therefore also below the plungers 19 there is the low pressure within the storage tank 29. Finally the switch 46 is opened by hand, and the safety valves 33 and 52 are closed.

As appears from the above description, all the electromagnets 47 are controlled by the same switch 46, and therefore all the safety valves are simultaneously opened for permitting the liquid to escape from the cylinders 24 and relieving the pressure of the said liquid. The pressure transmitting devices 32 are charged with pressure fluid through the pipes 40, and the liquid is supplied to the plungers 19 and 37 at the points 11 and 12 through the pipe 51 and the check valves 54.

For each pressure transmitting device 32 a separate supply 40 for low pressure fluid and reducing valve 41 are provided, and therefore the pressure acting on the pistons 36 may be independently regulated according to the pressure needed at each point 10, 11, 12 or 13.

From the foregoing description it will be understood that the cushioning device for the slide is simple in construction and reliable in operation, and that it may be operated with pressure fluid which will be found in any work shop. When the press is installed in a work shop it is only necessary to connect the storage tank 29 to a suitable low pressure liquid supply and the pressure transmitting devices 32 to a suitable air pressure supply. Thereafter the operation of the cushioning device is automatic and after the safety valves 33, 52 have once been opened the liquid is automatically supplied to the cushioning devices. The cushioning device is also constructed so as to provide a safety device by means of which the liquid pressure within the cylinders 24 is immediately relieved whenever the slide meets an excessive resistance. Thus injury to the slide and its driving mechanism is avoided.

While in describing the invention reference has been made to a blank holder for sheet metal blanks I wish it to be understood that my invention is not limited to such use, and that my improved cushioning system may be used in presses or machine tools of any type.

WILHELM SCHMITT.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

W. SCHMITT

PRESSES

Filed Oct. 24, 1940

Serial No. 362,519½

2 Sheets-Sheet 1

Fig. 2

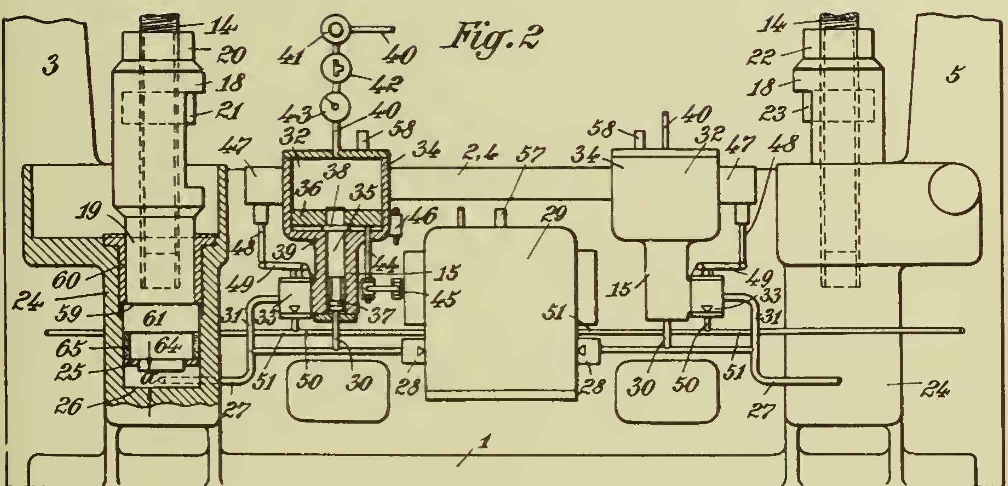
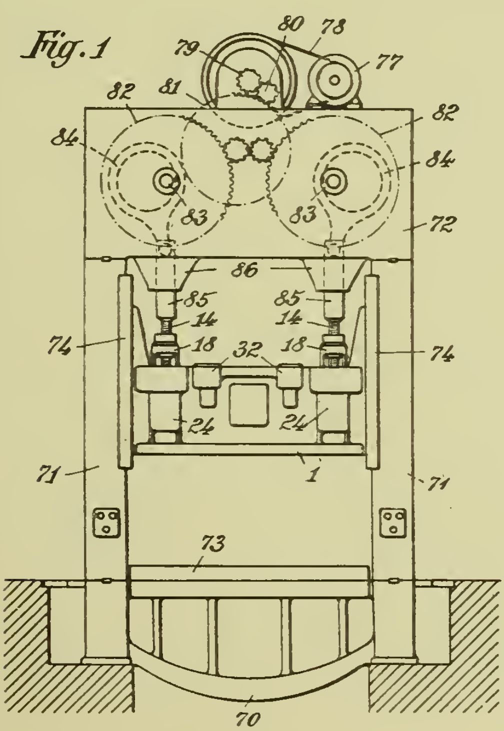


Fig. 1



Inventor:

Wilhelm Schmitt

by

Franz Reinhold

Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. SCHMITT
PRESSES
Filed Oct. 24, 1940

Serial No.
362,519½
2 Sheets-Sheet 2

Fig. 3

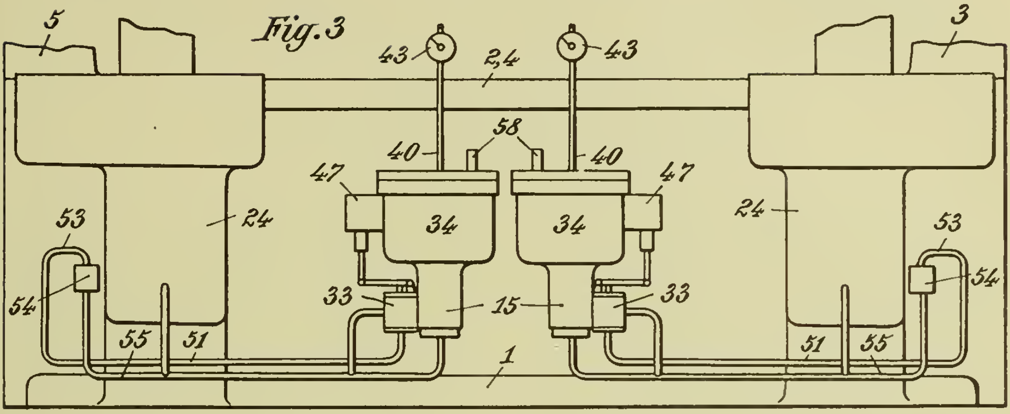
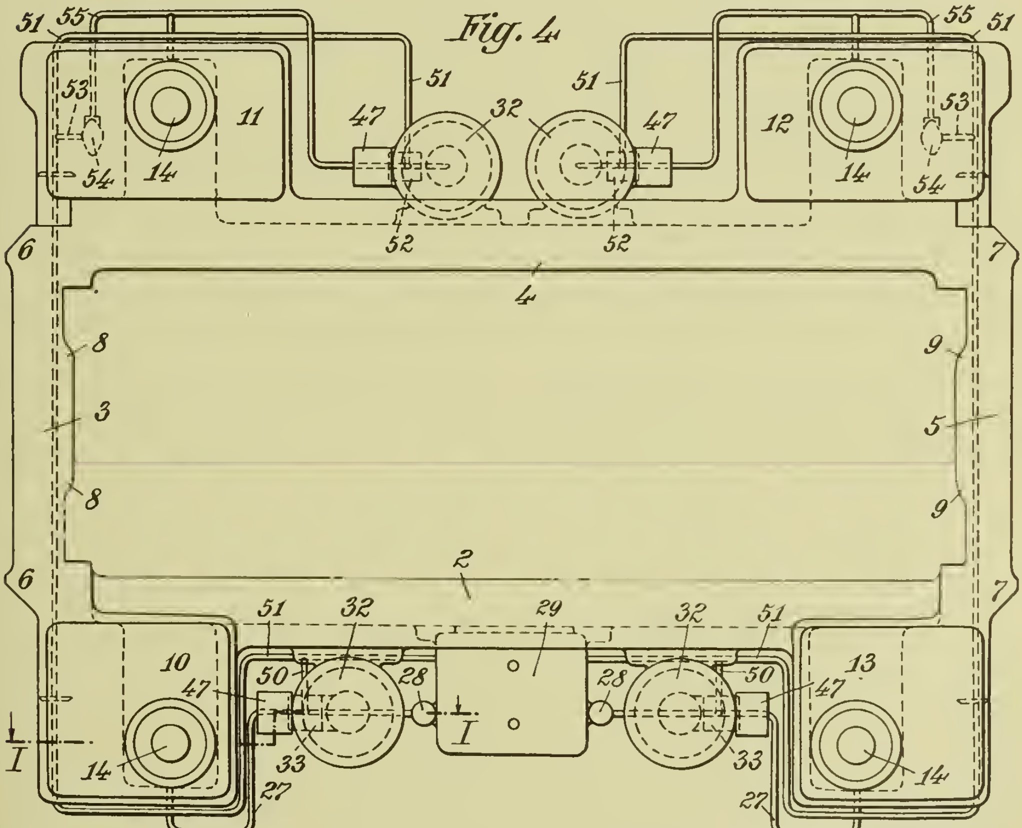


Fig. 4



Inventor:
Wilhelm Schmitt
by
Franz Reichert
Attorney

Published May 11, 1943 Serial No. 362,559½

ALIEN PROPERTY CUSTODIAN

STAND FOR COOKING VESSELS

Margarete Hendel, Leipzig W 31, Germany; vested in the Alien Property Custodian

Application filed October 24, 1940

This invention relates to a stand for supporting cooking vessels on cooking apparatus operated by a flame produced by gas, etc., and has for its object to provide a stand of a type capable of preventing accidents due to the extinction of the flame by overflowing cooking material and the consequent outflow of gas, etc.

The invention substantially consists in providing a stand to be placed on a cooking apparatus of the kind mentioned above a burner for supporting a cooking vessel and possessing a deflecting member surrounding the vessel or disposed below the bottom thereof to keep overflowing material away from the burner and the combustion zone, or equipped with a cylindrical screening wall surrounding the burner.

Three embodiments of the invention are illustrated in the accompanying drawing, in which

Figure 1 is a partial elevation of a stand according to the invention within or upon which a cooking vessel may be placed;

Fig. 2, a section thereof showing also a burner;

Fig. 3, a partial view of a modification of the construction shown in Fig. 1;

Fig. 4, a partial view of another constructional embodiment for supporting a vessel placed on the top thereof;

Figs. 5 and 6 are partial views of modifications of the stand shown in Fig. 4;

Fig. 7 is a section of Fig. 5; and

Fig. 8 is a section of Fig. 6.

As indicated in Fig. 1, the stand to be placed upon a cooking apparatus for supporting a pot **19** which may be inserted therein or placed upon it comprises a circular side wall with a bottom shelf sloping toward the side wall and leaving a central opening that can be reduced in size by the insertion of a ring or of rings **3** to permit the heating of smaller vessels. The top edge of the side wall possesses an outwardly extending inclined deflecting flange or member **2**, and in the channel formed between the sloping shelf **1** and the side wall spaced holes **4** are provided. In operation, the flame contacts through the central opening with the bottom of the vessel, and overflowing material is deflected by the flange **2** or, in case of smaller vessels, through the holes **4**.

In the construction shown in Fig. 3 the outwardly sloping bottom shelf **6** has an upturned inner edge on which spaced supports **9** for holding a vessel are provided. Between the supports **9** clear spaces **12** are left, and in the circular channel formed between the side wall **5** having openings **8** and the bottom shelf **6** holes **10** normally supplying secondary air are arranged. The top edge of the side wall **5** is fitted with a circular outwardly inclined deflecting flange **7**. The vessel rests on the supports **9**, and overflowing material is discharged by the flange **7**, or, if a vessel is smaller than the diameter of the stand, through the holes **10**.

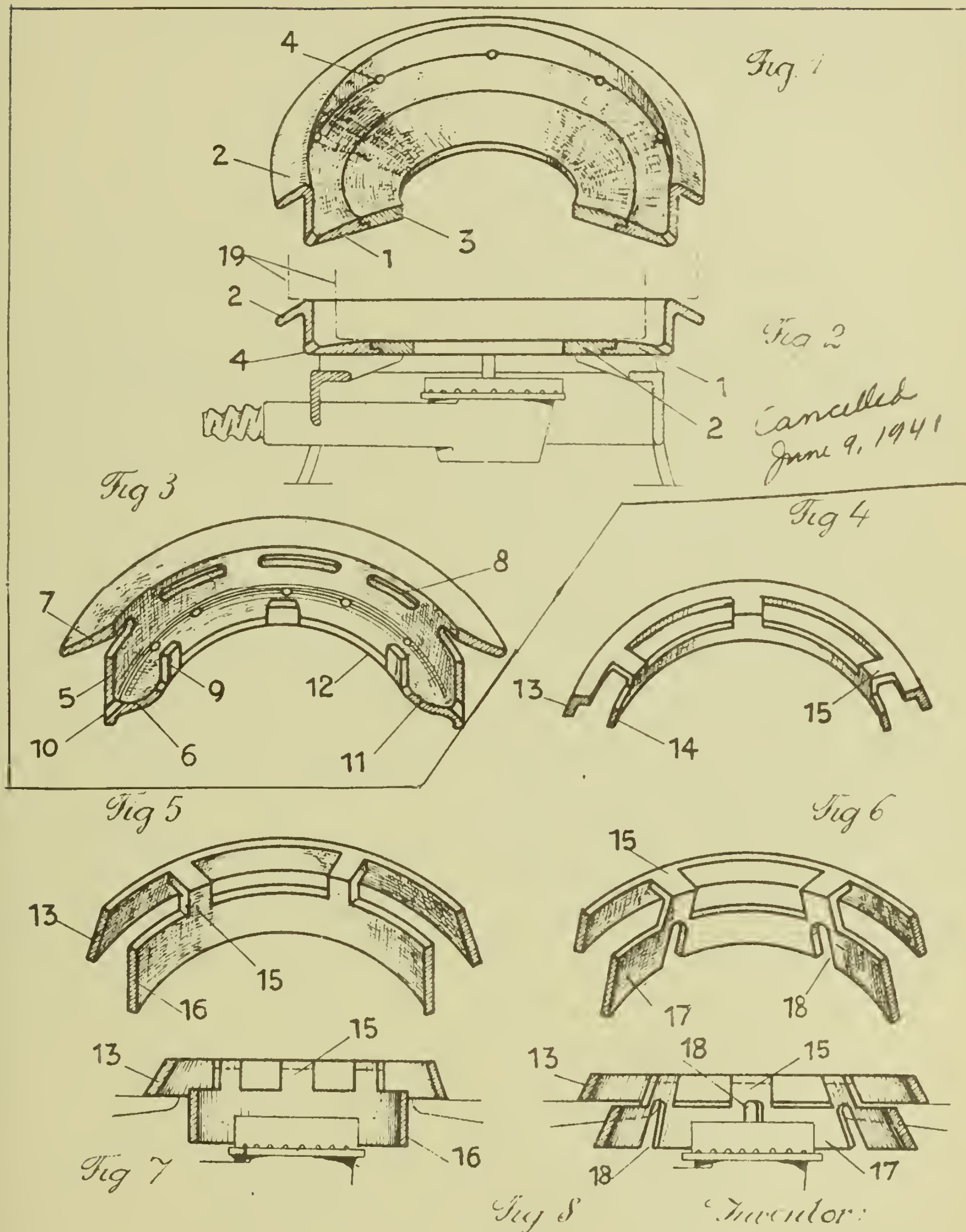
The construction just described affords the advantage that the flame can pass through the openings **8** and **12** and, fanned by the air, sweep also over the sides of the pot. Larger vessels are placed on the supports **9** while smaller vessels may be inserted in the stand.

Figs. 4 to 8 show a modification of the construction shown in Fig. 3, which is suited, however, only for holding a vessel placed upon it. The stand shown comprises two preferably conical rings, the outer ring **13** acting also as deflecting member being positioned slightly higher than the inner ring **14** which serves as support of the stand on the cooking apparatus. Both rings **13**, **14** are connected on top by preferably angular bridges **15** which have flat upper surfaces assisting in supporting a vessel. In this case, too, the flame sweeping outwardly between the two rings **13**, **14** is fanned by the air current and heats also the sides of the vessel. The outer ring **13** may also have a flat top.

Figs. 5 and 6 show in principle a construction similar to that shown in Fig. 4 with the difference, however, that the inner ring **14** is enlarged so as to surround the burner, shown in Fig. 2, in the form of a cylindrical screening member **16** which, as indicated in Fig. 6, is conically constructed and resembles a truncated cone **17**. In the construction shown in Fig. 6 the screening side wall **17** has clearances **18** for engaging the burner. Figs. 7 and 8 illustrate the two constructions shown in Figs. 5 and 6 in section. The side wall **17** may further be of wavy or spiral cross section to enlarge the air passage between it and the burner.

MARGARETE HENDEL.

PUBLISHED	M. HENDEL	Serial No.
MAY 11, 1943.	STAND FOR COOKING VESSELS	362,559 ½
BY A. P. C.	Filed Oct. 24, 1940	



Published May 11, 1943 Serial No. 362,656

ALIEN PROPERTY CUSTODIAN

METHOD OF PRODUCING HIGH FIRE-PROOF MATERIALS

Otto Krause and Max Schiedeck, Breslau, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 24, 1940

Generally high fire-proof materials from silicon carbide are produced in such a manner that silicon carbide of various granulation is mixed with 3% or more of ball clay and burnt. In such materials f. i. stones, cements and the like many demands must be claimed in regard to durability and stability against heating and the like. Above all, the materials shall be very compact and contain as few air spaces as possible in order to resist well the attack of aggressive gases of vapours.

Now it has been found a method which increases considerably the application value of this materials. The method consists in the formation of glasslike fused masses within and outside of the materials by which, above all, the apparent porosity is diminished and the tightness increased. According to the invention a small amount of titanium oxide is added to a known mixture of for instance granulated silicon carbide and 3% or more of ball clay whereupon the material is burnt. It has been found that 1% of titanium oxide in the mass is specially advantageous. More or less amount of this substance does not give more favourable results. If the mass does not contain iron oxide, for instance from the contamination of silicon carbide, it is favourable to add it also in an amount of about 1%. Materials according to the invention have a considerably larger durability than a mass not containing titanium oxide.

OTTO KRAUSE.
MAX SCHIEDECK.

Published May 11, 1943

Serial No. 362,699

ALIEN PROPERTY CUSTODIAN

DEVICES RESPONSIVE TO THE RATE OF FLOW THROUGH A CONDUIT

Guido Wünsch, Berlin-Wannsee, Germany; vested in the Alien Property Custodian

Application filed October 24, 1940

This invention relates to improvements in or relating to devices responsive to the rate of a fluid flow through a conduit.

The devices of this kind comprise a pressure responsive system adapted to be acted upon by the pressure drop at a constriction in the conduit through which the fluid to be measured or regulated flows. As is well known, the pressure drop is a square function of the rate of flow so that upon the rate decreasing to one half the pressure drop decreases to one quarter. Accordingly at small rates, i. e. at a small load the pressure drop is too slight to control a measuring or regulating element. If on the other hand the cross section of the constriction in the conduit is diminished so as to furnish an adequate pressure drop or dynamic pressure even at small loads, the pressure drop increase becomes excessive at great loads. The greater this pressure increase the less is the sensitivity of the pressure responsive system acted upon by said pressure drop. Therefore the variation of the cross section of the constriction cannot lead to a satisfactory solution.

The present invention aims at overcoming these difficulties by providing a shunt communicating with the conduit on both sides of the constriction and a plurality of auxiliary constrictions in said shunt for dividing the pressure drop over the whole length of said shunt or the pressure drop above the main constriction in the conduit in accordance with the number of auxiliary constrictions. In this way one of the respective partial pressure drops may be used to act upon the pressure responsive system, it being understood that such a partial pressure drop may have the same value at a great load as the pressure at the main constriction at a small load.

In order to more fully explain the further aims, objects and advantages of my invention an embodiment thereof will now be described in connection with the annexed drawing in which

Fig. 1 is a sectional view of a controlling system for maintaining constant the rate of flow through a conduit, and

Fig. 2 shows a diagram of a ratio control system comprising two rate responsive devices according to the present invention.

Referring now to the drawings, a gas or liquid flows through a conduit **1** in which a butterfly valve **2** is provided for controlling the flow so as to maintain constant the rate of flow. The valve **2** is operatively connected in any convenient manner to the piston **3** of a servo-motor actuated by any pressure fluid relay—shown in the drawings to be a well known Askania jet pipe relay **4**—the jet pipe thereof being deflected in response to a controlling value thereby controlling the pressure difference in the two conduits **5** and **6** leading to both sides of the servomotor as shown in Fig. 1. In the embodiment shown the valve **2** in the conduit **1** is to be controlled in response to the rate of flow. Therefore a pressure responsive system **7** is provided for controlling the jet pipe relay **4** in said system comprising in a well known manner a membrane **8** acted upon by the pressure drop at an orifice plate **9** in the conduit **1**. The two chambers separated by the membrane **8** communicate with measuring pressure conduits **10** and **11**, respectively, leading to both sides of the orifice plate **9** in the conduit **1**.

The device described above operates as follows: Be it assumed that the rate of flow in the conduit **1** increases thereby increasing the pressure drop or dynamic pressure at the orifice plate **9**. Accordingly the force exerted by the diaphragm **8** toward the right increases correspondingly and deflects the jet pipe **4** clockwise so that the pressure above the piston **3** increases and the piston is moved downwardly urging the valve **2** towards its closed position until the rate of flow is restored to the predetermined value to be maintained constant.

This value may be chosen at will. However, as explained above, the measuring pressure actuating the membrane **8** and the jet pipe **4** is a square function of the rate in the conduit **1**. If for instance the rate value to be maintained constant is doubled the pressure drop at the membrane **8** is increased to the quadruple value, i. e. a value which overloads the membrane.

According to the present invention the following solution is proposed: Two measuring pressure conduits **10** and **11** do not communicate directly in the usual manner with the conduit **1** but with a shunt **12** which in turn communicates with the conduit **1** on both sides of the orifice plate **9**. This shunt comprises a plurality of auxiliary orifice plates; in the embodiment are shown three orifice plates **13**, **14** and **15**. The middle orifice plate **14** is arranged between the measuring pressure conduits **10** and **11**. As may be readily understood, the pressure drop at the main orifice plate **9** in the conduit **1** is divided into three partial pressure drops by the three auxiliary constrictions **13**, **14** and **15**. If the three constrictions have the same cross section, the pressure drop before each of

said constrictions amounts to one third of the pressure drop before the orifice plate 9.

The middle constriction 14 is arranged between the two measuring pressure conduits 10 and 11 so that the membrane 8 is acted upon by the partial pressure at 14 provided that the shunt 12 is open. However, if the shunt flow is interrupted by means of a valve 16, the pressure drop at 9 acts upon the diaphragm 8. In this event the conditions are the same as if the conduits 10 and 11 communicated directly with the conduit 1 in the usual manner.

From the foregoing it follows that the valve 16 should be closed as soon as the rate value to be maintained constant is materially decreased and vice versa. Provided that the partial pressure at 14 amounts to one third of the dynamic pressure at 9, the controlling pressure acting upon the membrane 8 remains the same if the rate value to be maintained constant is tripled and at the same time the valve 16 is opened.

It is to be noted that in addition to or instead of the auxiliary constrictions 13 and 15 a short circuited conduit may be provided bridging over the auxiliary constriction 14 and the auxiliary constrictions 13 and 15. It is self-evident that such a short circuited conduit must possess means for shutting off this conduit.

Furthermore the cross section of the auxiliary constrictions may be varied with respect to each other in order to facilitate the adaptation of the control system to the load variations. Therefore I prefer to specially provide easily adjustable orifice plates for the constrictions 13, 14, 15.

Fig. 2 shows another embodiment, i. e. a ratio control system provided for maintaining constant the ratio of the rates of flow through the conduits *1a* and *1b*, respectively. In combustion control regulators for instance combustion air flows through the conduit *1a*, whilst the gas passes through the conduit *1b*. In order to ensure economical combustion, it is necessary to maintain the most favorable ratio between air and gas.

As shown in Fig. 2 each of the two conduits *1a* and *1b* comprises a shunt *12a*, *12b*, respectively. The shunts each comprise three auxiliary constrictions *13a*, *14a*, *15a* and *13b*, *14b*, *15b*, respectively, as well as a valve *16a*, *16b*, respectively. Accordingly there are two membrane systems *7a*, *7b* acting upon a jet pipe relay 4' in opposite directions, said jet pipe relay 4' corresponding to the jet pipe relay 4 in Fig. 1. As in Fig. 1 a servo-motor—*3a*—is provided for adjusting a valve *2a* in the combustion air conduit *1a*.

The membrane system *7a* does not directly engage the jet pipe 4', but an intermediate lever 17 having a fixed axle 18 and being arranged substantially parallel to the jet pipe 4'. The force exerted by the membrane system *7a* on the intermediate lever 17 is transmitted to the jet pipe 4' by means of a well known so-called ratio slider 19 which permits to vary at will the air—gas ratio to be maintained constant.

The ratio controller as shown in Fig. 2 operates as follows: In the event of a rate increase of the gas or fuel flow in the conduit *1b*, the pressure drop increases so that the jet pipe 4' is deflected clockwise, thereby displacing the piston of the servo-motor *3a* to the right and tending to further open the valve *2a*. Therefore the combustion air flow will likewise be increased in accordance with the increase in the gas or fuel flow.

What is said about the rate responsive device explained with reference to Fig. 1 equally applies to the embodiment shown in Fig. 2. By opening or closing the valves *16a*, *16b* in the shunts *12a*, *12b* the ratio controller may easily be adapted to the load or the absolute rate of flow in the conduits *1a*, *1b*.

Obviously the present invention is by no means restricted to the particular embodiment herein shown and described by way of example only. Many modifications may be made without departing from the spirit of the invention. For instance the principle according to the invention may be likewise utilized for metering instruments of any kind. Furthermore the invention may be used also in cases in which considerable variations in the specific gravity are to be considered in addition to or instead of the rate of flow. In this respect it may be pointed out that the dynamic pressure is dependent not only on the amount of flow passing a constriction but also on the specific gravity.

GUIDO WÜNSCH.

PUBLISHED
MAY 11, 1943
BY A. P. C.

G. WÜNSCH
DEVICE RESPONSIVE TO THE RATE OF FLOW
THROUGH A CONDUIT
Filed Oct. 24, 1940

Serial No.
362,699
2 Sheets-Sheet 1

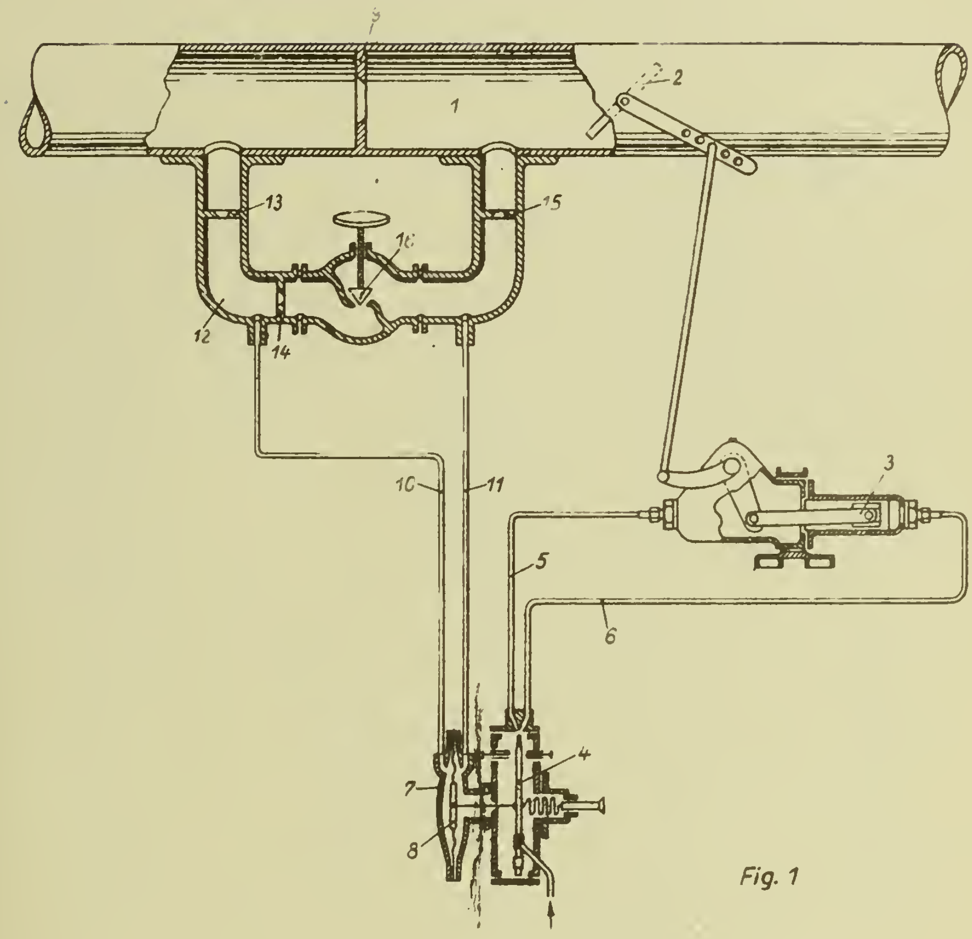


Fig. 1

Am 1949

Inventor:
Guido Wunsch
By
A. D. Adams
Attorney

PUBLISHED

MAY 11, 1943.

BY A. P. C.

G. WÜNSCH

DEVICES RESPONSIVE TO THE RATE OF FLOW THROUGH A CONDUIT

Filed Oct. 24, 1940

Serial No. 362,699

2 Sheets-Sheet 2

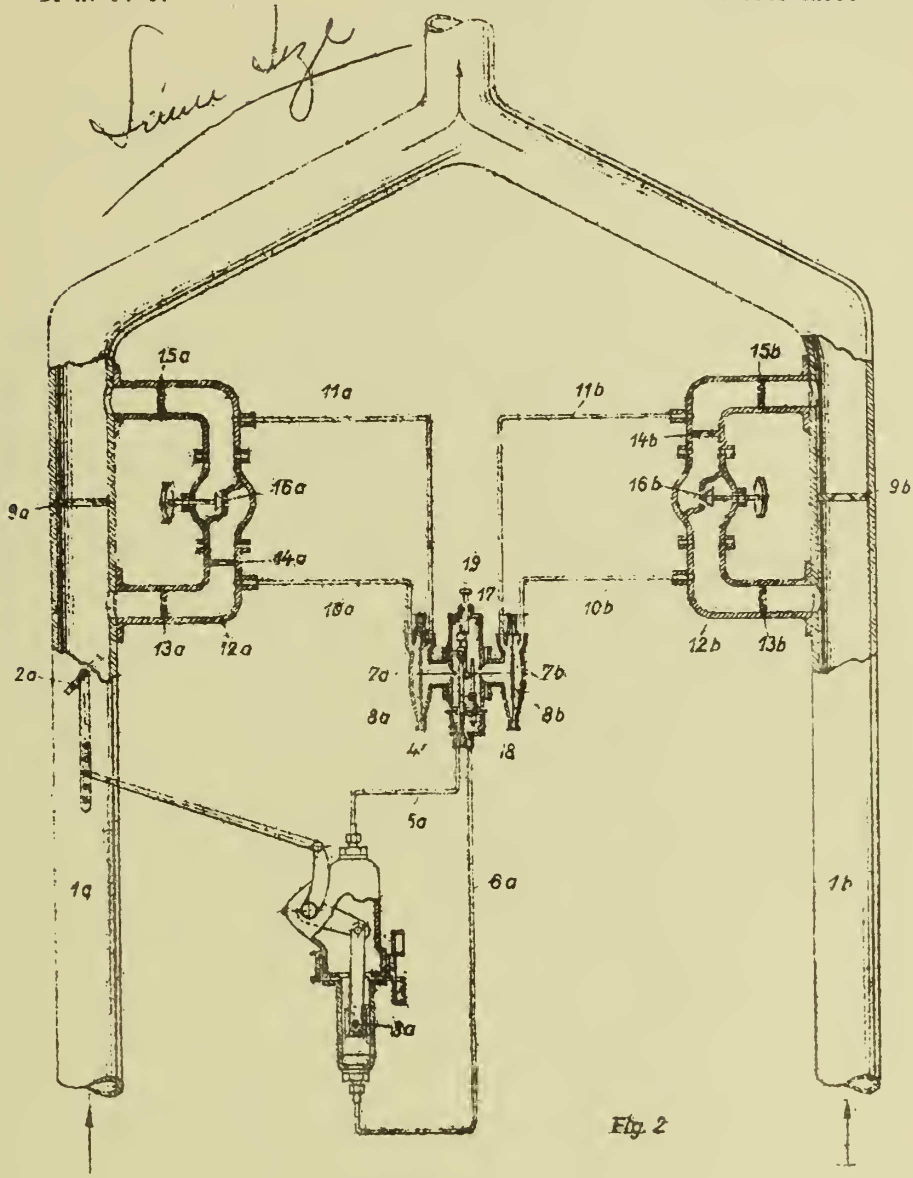


Fig. 2

Am 1949

Inventor

Guido Wunsch

By A. D. Adams

Attorney

Published May 11, 1943

Serial No. 363,141

ALIEN PROPERTY CUSTODIAN

PHOTOGRAPHIC CAMERAS

Rudolf Reuss, Dresden, Germany; vested in the Alien Property Custodian

Application filed October 28, 1940

The invention relates to improvements in photographic cameras and particularly is directed to a novel arrangement and design of the diaphragm aperture scale on camera objective mounts.

It is the principal object of the invention to provide camera objectives with a novel design of a diaphragm aperture indicating scale, including among other features a number of symbols which by their size of which they are made indicate the relative size of the various apertures to which the diaphragm is adjustable. Such an aperture scale is particularly useful for beginners in photography, who sometimes experience difficulties in correctly interpreting the customary diaphragm aperture scale in which the smaller numerals indicate larger absolute diaphragm apertures, while the smaller absolute diaphragm apertures are indicated by higher numerals, or so called *f*-values, since it is these values which determine the time of exposure. In accordance with the above named object of the invention the numerals indicating a large diaphragm aperture are made relatively large in size while the numerals indicating successively smaller diaphragm apertures are made correspondingly of successively smaller size.

Another object of the invention is to emphasize the importance of the diaphragm aperture indicating numerals by making the same not only of varying size, but also of varying degree of heaviness, the numerals indicating the large aperture being made rather heavy while the numerals indicating smaller apertures being made correspondingly lighter.

It is also an object of the invention to surround each numeral of the diaphragm aperture scale by a frame, which frames become successively smaller in size or area toward the end of the scale which indicates the smallest aperture size.

Other objects of the invention will be apparent or will be specifically pointed out in the description forming a part of this specification, but the invention is not limited to the embodiments herein described, as various forms may be adopted within the scope of the claims.

Referring to the figures which illustrate by way of example two embodiments of the invention:

Fig. 1 is a top plan view of a camera objective with a diaphragm aperture scale arranged on the circumference of the shutter casing, and

Fig. 2 is a front elevation view of a modification in which the diaphragm aperture scale is arranged on the front face of the shutter casing.

Referring to Fig. 1, the camera objective **2** in conventional manner is combined with a shutter, the shutter casing, of which is designated with **3**, and an adjustable diaphragm of which only the diaphragm adjusting lever **4** is visible. A portion of the camera bellows is shown at **5** and the shutter tensioning lever is indicated at **6**. The diaphragm aperture scale is arranged on the circumference of the shutter casing **3** and includes of a plurality of numerals **8**, each of which indicates the *f*-value of the diaphragm to which the latter is adjusted when the diaphragm adjusting lever **4** has been moved opposite the scale division **9** which is associated with each numeral. It will be noted that the size of the numerals **8** decreases from the left hand end of the scale toward the right hand end of the scale to indicate that the size of the diaphragm aperture decreases when the lever **4** is moved toward the right hand side, although the absolute value of the numerals **8** increases from 2.8 to 22. Furthermore, the numerals **8** decrease gradually in heaviness from the left toward the right, the heavier numerals indicating that the diaphragm aperture increases in size when the lever **4** is moved toward the heavier numerals.

In order to emphasize additionally that the size of the aperture of the diaphragm is reduced toward the lighter numerals, the entire series of numerals **8** is surrounded by a longitudinal frame **12** whose width decreases gradually toward the right hand end.

In the modification illustrated in Fig. 2, the diaphragm aperture scale is arranged on the front face **14** of the shutter casing **3**, and the numerals **8**[a] associated with the scale divisions **9**[a] are made all of the same size, but they are made of varying heaviness, the heavy numerals indicating that they represent diaphragm apertures of larger size as the lighter numerals. Furthermore, each numeral **8**[a] is set into a separate frame **15**, which in the embodiment shown consist of a polygon, and each frame **15** has a different size. The larger frames indicate larger diaphragm apertures and the smaller frame correspondingly smaller apertures. In addition hereto, the frames **15** are connected with each other by an arrow **16** whose point **17** is directed toward the smallest frame **15** which surrounds the lightest numeral "16", while the tail of the arrow **16**, increases in thickness toward the largest frame **15** surrounding the heaviest numeral "2.8".

The different additional symbols to distinguish the numerals from each other may be employed

in various manner to indicate more emphatically that the numerals of the smallest numerical value represent the largest diaphragm aperture. For instance the scale lines 9 and 9ª associated with the numerals 8 and 8ª respectively may be made gradually heavier from one end of the scale toward the other. The frames 15 may only be applied to the numerals 8ª at the end of the scale, and the area of the longitudinal frame 12 and that of the tail of the arrow 16 may be variably colored in such manner that the color becomes gradually darker toward the end of the scale which represents the smaller diaphragm apertures.

RUDOLF REUSS.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. REUSS

PHOTOGRAPHIC CAMERAS

Filed Oct. 28, 1940

Serial No. 363,141

Fig. 1

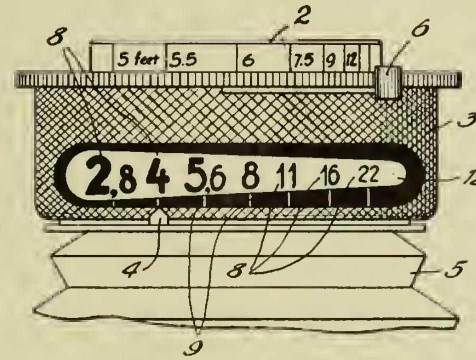
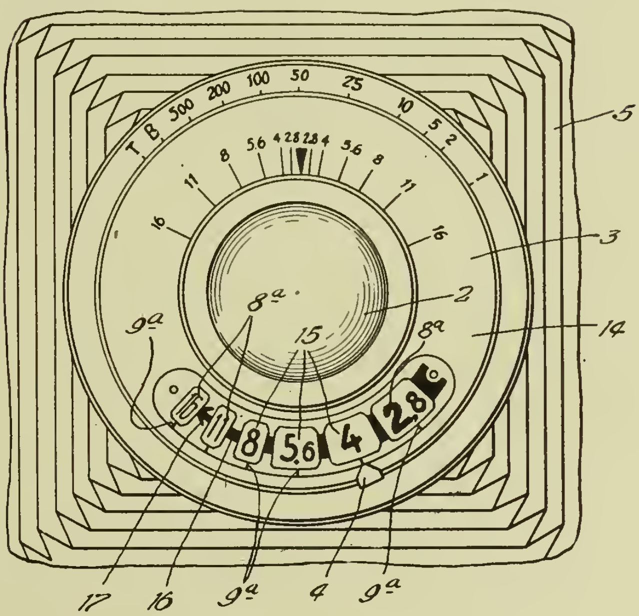


Fig. 2



Inventor
Rudolf Reuss
BY:-
Singer, Ehlert, Stern & Carlberg
Attys.

Published May 11, 1943

Serial No. 363,506

ALIEN PROPERTY CUSTODIAN

PROCESS FOR INCREASING THE EFFICIENCY OF STORAGE BATTERIES

Richard Beck, Mainz, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 30, 1940

This invention relates to storage batteries, and particularly to a process for increasing the efficiency of storage batteries and improving other qualities thereof which are essential for their operation or charging and discharging.

It is known to add substances to the electrolyte of accumulators for the purpose of influencing certain properties of the electrolyte and thereby of the accumulator so as to improve for instance depolarization and efficiency, to lengthen the life of the plates, to prevent or reduce sulfatization, etc. Although these substances are added in considerable quantities, their effect in producing the desired results has not been satisfactory.

It has been found now that the efficiency can be increased to a surprisingly high degree, that is, more than 20%, by adding to the electrolyte a small amount of a solution of a substance, prepared by dilution in stages, or of a mixture of solutions of different substances, also prepared by dilution in stages.

The dilution of the substance or substances may be carried on to such a degree that the solution, which is to be added in quantities of a few cu. cm. per liter electrolyte, scarcely contains amounts of the addition substance that can be ascertain by chemical methods. The maximum content of solid matter in the final solution is as a rule not higher than 0.001%. The number of dilution stages is of special importance for the effect attained. As the effects of the various stages differ materially from one another, it is necessary empirically to ascertain the stage of dilution producing the optimum effect in each instance, that is, for each particular electrolyte and a certain addition substance.

Particularly favorable effects can be attained in certain circumstances by mixing solutions of different substances each of which has been brought to its optimum dilution stage or power.

Besides the efficiency, other conditions, especially the charging voltage, are improved by such additions. The charging voltage of accumulators having electrolytes treated according to the invention is as a rule about 10% below the normal voltage which would otherwise prevail. This involves not only a saving in the energy required for charging, but insures also a highly desirable constancy of the voltage during charging, which is of special importance when charging and discharging occur in continual alteration as for instance in storage batteries for motor vehicles.

Constancy of the voltage has, moreover, a favorable effect upon the life of the incandescent lamps and connected apparatus which are considerably damaged by the usual over-voltage.

The addition of solutions diluted in stages according to the invention decreases also the gas development in the charged accumlator by considerably reducing the electrolytic decomposition of water. The result is that the destructive influence of the gas deevlopment on the active paste of the negative electrodes is diminished and the life of the latter increased. In further consequence hereof the water need be supplemented less often.

Practically all organic and inorganic substances may be added in the form of solutions highly diluted in stages. The processes to which the action of these substances in certain stages of attenuation or potencies is due may be compared to the dynamization of medicines for homeopathic purposes, which is performed in similar manner by dilution in stages.

It has been found that the water soluble monobasic organic acids of the general formula $C_nH_{2n}O_2$, in a corresponding stage of dilution, are particularly suitable substances, either by themselves or in mixture with attenuated solutions of other, preferably inorganic, substances. Specially suitable among the latter, according to investigations made so far, are those that contain NO_2 ions, since they enhance the effect of most of the addition substances present in the solution diluted in stages.

Special suitability, besides homogeneously composed substances, possess also some extracts from animal or vegetable substances when diluted in stages whose number has to be ascertained in the manner explained.

Experiments have shown that the effect of the substances added according to the invention becomes noticeable only after repeated charging and discharging and usually disappears when the electrolytes treated in the manner described are heated to boiling temperature.

Owing to the improvement of the properties of accumulators by the treatment according to the invention, it is possible in certain circumstances to employ inferior plate material, as aluminum, and still to attain a sufficient output, or, in other words, to produce an accumulator of normal output at a much reduced cost and from more easily obtainable material.

An example of the application of the new process is the following:

2 cu. cm. of an extract of horsetail or scouring rushes (equisetum arvense) diluted to the 14th stage at a ratio of 1:10 are added per liter electrolyte.

A further example is: A corresponding quantity of a mixture of a silver nitrate solution diluted to the 7th stage and of a solution, diluted to the 5th stage, of a water soluble fatty acid is added per liter electrolyte.

RICHARD BECK.

Published May 11, 1943

Serial No. 365,389

ALIEN PROPERTY CUSTODIAN

PREPARATION OF SKINS AND THE LIKE

Zoltán Vág, Budapest, Hungary; vested in the Alien Property Custodian

No Drawing. Application filed November 12, 1940

This invention relates to a method of preparing or improving skins and the like, preserving the hide in its natural flat form and allowing the hairs to stand away freely from one another and from the hide in natural manner. It includes the following steps which can be carried out by hand or mechanically at individual points or over large areas of the skin. The hairs of the skin are softened in a degree that allows the natural elasticity of the hairs to remain, at least partly, temporarily latent. A hair fixative agent in viscous state is applied to the hairs capable of hardening on them. The hairs are deflected from their given position and form to bring them into a changed position and form, structurally rearranged at will and thoroughly from the root to the free end, in the manner of naturally grown hairs, while the hairs are softened and before the applied fixative has been hardened on the hairs. The fixative is then allowed to harden on the previously arranged hairs thereby fixing the hairs in their new order, position and form, until the natural elasticity of the treated hairs attached to their produced new order, position and form revives again. The fixative is lastly removed from the hairs.

The hairs may be softened before the application or hardening of the fixative by means of water, glycerine, oil-emulsion or other hair-softening agent for example one which dissolves the fixative, which facilitates the preliminary rearrangement and also the fixing of the hairs. Stem, especially steam of water acts also as hair-softener. The degree of hair softening is determined by the quality, particularly by the roughness of the hairs to be treated. The softened hairs suffer by their deformation during the process according to the invention no notable stresses.

As fixative glue, gelatine, and dextrine, water glass or the like are used which finally do not detract from the natural elasticity of the hairs. They offer as a characteristic feature of the invention an intermediate stage in which they behave as a viscous liquid and make the hairs capable of being freely arranged and folded over either separately or in groups or in large areas, even individual operations as for example, local corrections being possible.

The preliminary arranging or shaping can be carried out for example by means of combs, brushes, curry-combs, rubbers and also the means referred to below. The hairs may be given any desired direction and also whirls, curls, waves, moire-structure, Persian designs and so forth. They may cross one another, the similar refracting groups may be laid to run in the same direction and the unattractive parts can be hidden underneath other parts.

The fixing has a permanent effect so that the hairs subsequently retain the various positions and shapes given to them and stand up to the stresses occurring when in use even though the fixative is later removed from selected parts or from the whole of the skin by means of beaters, brushes or by suction or compressed air and so forth.

The fixative can be applied in combination with its solvent or with water or another softening agent and this may occur simultaneously with the preliminary arrangement or shaping of the hairs. The degree and also the commencement of the fixing hardening can thus be regulated in conformity with the necessary preliminary operations.

The choice of the hair fixative agent and the time during which it is allowed to adhere to the hairs depend likewise on the quality, namely on the softness or roughness of the hairs to be treated.

If the roughness of the hairs necessitates the application of a fixative with strong adhesiveness this should be mixed with such a hair softening agent as, on the one hand, reduces the adhesiveness of the fixative and, on the other hand, makes the fixative brittle, when hardened on the hairs and dried. So it will be expedient for example to mix a thick solution of glue with glycerine.

When skins are metallized in a known manner the gold or other coatings make the hairs stiff and brittle. The metal is frequently sprayed on so that it covers only the near side of the hair and also it forms a continuous covering which bridges over the gaps between the hairs so that the structure of the fur suffers considerably. The metallization offers no opportunity for re-arranging and correcting the hairs and the metal coating cannot be removed. The invention avoids this drawback and makes possible also the manufacture of fancy goods which still retain constantly a natural skin character and which can be bent and compressed in the usual manner.

A method is known according to which the hairs receive first a dressing to render them proof against humidity, the dressed furs are then allowed to dry and are finally submitted to a goffering process, effected by means of engraved cylinders or plates. This method has several disadvantages. Such dressings, as a rule, attack

the hairs chemically. The hairs are treated in dry state which causes them to suffer excessive stresses from the moulds. In addition to that the hairs are really pressed and formed only by the edges of the engraved moulds which moreover always treat only the outer lays of hair whereas the inner lays remain shaggy and dishevelled. In this way no effective designs having the appearanc of naturally grown hairs can be obtained. A further drawback of this method is that the waterproof dressing cannot subsequently be removed from the hairs, or at least not without endangering the durability of the designs reproduced by the goffering. The invention avoids also these disadvantages.

Finally a method is known which makes the hide pucker by means of irregular basting-stitches, and by folding it along these latter, dampens the hairs with water, shapes and dries them. This method produce no designs having the character of naturalness, because the puckering causes everywhere unnatural differences of level of the hide surface so that it ceases to be flat. Further disadvantages are that the designs are not durable, moisture causing them to vanish and that the puckered hide can be no more cut out and sewn together in the manner that is practised in the furrer's shop. The invention is free from these drawbacks as well.

A feature of the invention which makes possible a very thorough re-arrangement of the hair is that the application of the fixative or of the softening agent and/or the preliminary arranging or shaping of the hairs either locally or as a whole can be carried out from the roots thereof up to the free end.

The application of the fixative or of the softening agent and also the preliminary arranging or shaping of the hairs can be effected by means of various kinds of stencils, hollow patterns, rods, sticks, curling-irons and so forth. These devices can be placed at various points of the skin and will turn the hairs into various positions from the roots up to the free end so that the individual shapes in the skins will not have the appearance of mechanical similarity.

The application, drying or removal of the fixative or the softening agent and also the preliminary arrangement or shaping of the hairs can be carried out with the aid of heat in order to accelerate and complete the individual operative stages.

The fixative or the softening agent can be applied directly to the hairs of a skin which has been colored or one which is prepared in a usual manner and which may be ready for use, that is at any phase of the ordinary treatment of the hide.

The invention can also be applied for removing curls and smoothing the hair. The original or artificial imparted structure of the hair may according to the invention again be removed and the described preliminary re-arrangement and fixing thereof can be repeated as required as a whole or locally.

Example 1

Dextrine is diluted with hot water in 7° Bé, the solution is applied at 40° C, by means of a brush to a usually prepared calf skin or goatskin in a way that deflect the hairs from their original position.

Example 2

Wheat-starch or potato-starch is boiled up in water until the starch is entirely resolved. This mass is diluted with hot water in a viscous solution of 12° Bé. A pattern of iron-plate having holes cut out is placed on the hair side of a usually prepared foal skin, through the holes the hairs are covered with the viscous solution by means of a brush pressed on them. One or more whirls are made with the brush. The best shape to be given to the holes is longish-oval, in order that the whirls should not show full circles.

The moisture acts in both cases as hair softener. In both cases the viscous solution is dried until it has become hardened on the hairs. Then the fixative is removed from the hairs by shaking, brushing or beating of the skins. In this way one obtains skins with designs proof against rumpling, suited for ironing in which, like in natural designs, the hairs stand away freely from one another and from the hide.

The sticking together of the hairs is prevented, for the particles of the comparatively small quantities of the viscous solution which suffice to carry out the above described process are continually and energetically separated from each other in the operation of deflecting and re-arranging the hairs, whereas to be fully efficient, an adhesive must be left undisturbed. Moreover the strength of adhesion may be largely reduced by the dissolvents added to the fixatives and by other hair softening agents. Should some of the hairs stick nevertheless together, a subsequent brushing or some other means of removing the fixative, would cause the last remainder of the fixative to disappear.

This invention produces therefore in contradistinction to an older method operating with close sticking and goffering, pieces having the noblest texture of hairs.

The invention has the advantage of treating the hairs in a softened state, which means that they can be treated most sparingly, their required deformation causing no notable stresses of extension or torsion and it may be added that the fixative acts automatically and exactly in the new shape and lay of and along the whole of the hairs during any time. In contradistinction to all the older methods referred to it has moreover the peculiarity that the fixatives can be subsequently removed without any traces left and without damage done to the produced shapes of the hairs, and that the elasticity of the hairs temporarily latent during the treatment revives afterwards, attached to the produced new shape and order of them, so that the hairs after every permissible stress tend to get back to this new shape and order.

ZOLTÁN VÁG.

Published May 11, 1943

Serial No. 365,650

ALIEN PROPERTY CUSTODIAN

ROAD CONSTRUCTIONAL MATERIALS

Heinrich Ulrich, Ernst Ploetz and Oskar Ferrares, Ludwigshafen-on-Rhine, Germany; vested in the Alien Property Custodian

No Drawing. Application filed November 14, 1940

The present invention relates to bituminous road constructional materials.

We have found that bituminous road constructional materials may be prepared in a very advantageous manner by incorporating with the bituminous binding agents and the stone material, i. e. the rocks pebble, stone gravel, split and the like, nitrogenous substances obtainable by the interaction of alkylene diamines or polyalkylene polyamines and the sulfochlorides resulting from the action of halogen and sulphur dioxide on aliphatic hydrocarbons or halogenated aliphatic hydrocarbons containing at least 10 carbon atoms in the molecule.

The said nitrogenous substances may be derived for example from ethylene diamine, propylene diamine, hexamethylene diamine or diethylene triamine, triethylene tetramine etc. or the corresponding polyalkylene polyamines containing propylene or higher alkylene groups on the one hand and the products resulting from the action of chlorine and sulphur dioxide on decane, dodecane, octodecane or their chlorination products on the other hand. The sulfochlorides may be prepared for example according to application Ser. No. 227,510, filed in the names of Paul Herold, Karl Smeykal, Friedrich Asinger and Wilhelm Wolf on August 30, 1938. Instead of substances made from said simple components there may be used substances obtained from mixtures of the said di- or polyamines and/or mixtures of sulfochlorides of the said kind such as may be prepared from paraffin wax or aliphatic mineral oil fractions consisting substantially of paraffinic hydrocarbons with at least 10 carbon atoms. Other suitable starting materials for the preparation of the sulfochlorides are the aliphatic hydrocarbon mixtures resulting from the catalytic hydrogenation of carbon monoxide at relatively low superatmospheric pressures or the hydrocarbon mixtures obtainable by catalytic hydrogenation of olefines formed by dehydration of alcohols containing at least 10 carbon atoms which are obtained as by-products in the catalytic synthesis of methanol from carbon monoxide and hydrogen. Chlorination products of all of the said aliphatic hydrocarbons may also serve for the preparation of the sulfochlorides.

While rocks and stones of basic character, such as limestone, magnesite and clays, are by their nature hydrophobic to a certain degree and may therefore comparatively readily be combined with bituminous binding agents, in contradistinction thereto rock and stone varieties of acid character, such as granite and porphyry, are generally speaking hydrophilic and can only be combined with difficulty with bituminous binding agents. Accordingly, in the case of acid rock and stone it is especially advantageous to add the said nitrogenous substances which facilitate the combination of the two components.

Road constructional materials are prepared for example by bringing together hydrophilic varieties of rock or stone, such as porphyry, syenite, basalt, trass and the like which possess excellent hardness, great resistance to compression and stability to weathering influences, and suitable bituminous binding agents, as for example tar or asphalt, in the presence of the above described nitrogenous substances. The latter may be used in varying amounts which depend on the nature of the other components of the constructional material. For example a few per cent of the nitrogenous substances, calculated with reference to the binding agent, may be used, but in many cases amounts of about 1 per cent or less are sufficient. The road may be laid out in different ways. The said components of the mixture may be brought together simultaneously while thoroughly mixing them and the mixture then applied to the rock material; or the rock or stone may first be mixed with the binding agent and the nitrogenous substance of the said type then added, whereupon by further mixing the desired good combination of the components is effected. The di- or polyamine-sulfochloride reaction products may also first be applied to the rock or stone which is then mixed with the bituminous material; when the said nitrogenous substance is used in solution or in suspension in a liquid the mixture may be dried before the bituminous binding agent is added. The rock or stone may also be mixed with a solution or dispersion of the said nitrogenous substances in the binding agent.

The process may also be used with advantage with basic rock or stone, in particular such as contains considerable admixtures of acid rock or stone. A particular advantage resides in the fact that even binding agents containing large amounts of water, as for example emulsions, as well as wet rock or stone can be readily made to adhere. Furthermore, working in wet weather, which otherwise is frequently difficult, offers no difficulty.

The nature of the road constructional material may be varied in any desired manner by an addition of flux oils or substances increasing the viscosity or by chlorination of the bituminous binding agent or, when the latter is used in the

form of an emulsion, by an addition of emulsifying agents or by other similar measures.

The said nitrogenous substances may also be very advantageously used in filling grooves, such as occur for example in the construction of concrete roads, with bituminous materials.

By using more or less readily volatile bitumen solvents, an increased stability to frost and an increased lubricating property of the freshly prepared bitumen on the stone are obtained; this is advantageous in the rolling-in process in road construction and is necessary for the complete coating and covering of porous concrete surfaces.

The following examples will further illustrate the nature of this invention but the invention is not restricted to these examples. The parts are by weight.

Example 1

The surface of a freshly-made and shortly set concrete road covering is coated with a mixture of 78 parts of 60/40 road tar, 20 parts of asphalt bitumen having a softening point of 45° C. (according to Kraemer-Sarnow) and 2 parts of the reaction product of a diethylene triamine and a mixture of sulfochlorides obtained by treating a mixture of paraffin hydrocarbons containing from 10 to 18 carbon atoms in the molecule with chlorine and sulfur dioxide in the manner described in application Ser. No. 227,510. The upper layer can be applied to moist cement and its adhesion is not injured or impaired by any influence of external moisture, such as underground water, rain and the like.

Example 2

100 parts of porphyry chips of from 5 to 8 millimeters size are sprayed and completely moistened by mechanical mixing with 10 parts of a 2 per cent aqueous solution of the reaction product of polyethylene polyamine (a mixture of diethylene triamine, triethylene tetramine and the higher analogous compounds obtainable by reacting ethylene chloride with ammonia) and a mixture of sulfochlorides obtained by causing chlorine and sulfur dioxide to act on a mixture of aliphatic hydrocarbons with 16 to 18 carbon atoms originating from the catalytic hydrogenation of carbon monoxide, the treatment with chlorine and sulfur dioxide being carried out in the manner described in application Ser No. 227,510. The moistened porphyry chips are mixed with suitable amounts of an asphalt bitumen known under the name "Spramex 300" (having a softening point according to Kraemer-Sarnow of about 20° C.) which has been rendered workable in the cold by an addition of 20 per cent of benzene first runnings. The stone is uniformly coated with bitumen and the coating suffers scarcely any change after standing for 8 days under water, even when the temperature is temporarily raised to 75° C.

In the absence of the said nitrogenous additional substance only a bad combination of the bitumen with the stone takes place and after standing for a relatively short time under water at ordinary temperature such coating of bitumen is entirely loosened from the stone.

HEINRICH ULRICH.
ERNST PLOETZ.
OSKAR FERRARES.

Published May 11, 1943

Serial No. 365,724

ALIEN PROPERTY CUSTODIAN

PNEUMATIC DEVICE FOR RAISING AND CONVEYING SEMI-SOLIDS

Georg Neidl, Berlin W. 15, Germany; vested in the Alien Property Custodian

Application filed November 14, 1940

This invention relates to lifting devices and is particularly directed to a device for raising semi-solid masses, such as ore-bearing muds or cellulose used in the manufacture of paper or artificial wool, with the aid of compressed air.

The problem of raising semi-solids by mechanical means is difficult indeed and its satisfactory solution has offered almost insurmountable difficulties so far, not only in the metallurgical industry, but also in chemical enterprises of various types.

Attention is called to the practice prevailing in smelting establishments of draining the waste-water of blast-furnaces through settling-reservoirs in which the solid ore-bearing constituents are separated from the liquid. Such ore-bearing deposits contain a large percentage (in many cases up to 60%) of iron, and for that reason are valuable enough to be passed through another smelting process. In order to convey such almost solid and sticky muds to the place where they are subjected to another treatment it has been the custom so far to add to them a comparatively large percentage of water and to pump the whole to its place of destination, whereupon the solid constituents had again to be separated from the water before the actual treatment could begin. That a method of this kind, because of the waste of water and energy and the machinery needed to effect the separation, is an extremely costly affair needs hardly any explaining.

It has further been tried to mix these semi-solid and sticky masses with water and air, provided that the particular nature of the mass in question permitted such mixing. However, this method was likewise found uneconomic, because of the heavy consumption of water and air, and frequently resulted in the formation of lumps and incrustation and clogging of the pipes.

Attention is also invited to the difficulties encountered in the transportation of the oil-bearing muds of oil-fields. In order to increase the liquidity of this sticky material to such a degree that it can be pumped to refineries it has to be heated, while the pipes have to be insulated in order to prevent the dropping of the temperature, which naturally is complicated and expensive.

Plunger-pumps and centrifugal pumps of normal construction are too delicately designed to be used for the raising of mud-like masses, and also the hitherto known pneumatic systems have proved to be unsuited for the purpose in question. It was impossible to raise these semi-solid and sticky muds without the danger for the controlling means (floats) arranged in the lifting chambers to become encrusted with mud and tied up in the latter, so that they could no longer perform their controlling function. It was further impossible to move these sticky masses in a satisfactory manner through pressure pipes of frequently several hundreds or thousands of meters. The losses through friction in pipe lines like that are so considerable that an orderly conveyance of the masses is practically impossible, not to mention the constant danger of incrustation of the pipes and the high expense involved by a system like that.

Equally unsuited for the conveyance of mud-like masses is a known device for raising liquids, according to which a column of liquid is supposed to be lifted with the aid of air-bubbles rising in a vertically disposed pipe containing that column of liquid. It is understood that means like that are ineffective for the raising of masses of great density and a high specific weight like mud and similar substances, and they are completely out of place in cases where the mud-like masses have to be forced through horizontally disposed pipe-lines.

The present invention overcomes the aforesaid disadvantages of the known devices and solves the problem of raising semi-solid or mud-like masses with the aid of compressed air in a simple and efficient way by providing the raising means with a regulatably driven controlling mechanism for the valves which connect the pressure pipe with the ejectors and by devising that controlling mechanism in such a way that the valves are closed at a predetermined moment succeeding the moment of the completed ejection of the masses from the ejectors.

In pneumatic lifting devices into which the semi-solids enter by gravitation the control of the pressure air can be effected in a simple way if between the compresser and the controlling means a speed regulating mechanism is arranged by which the speed of rotation of the controlling means, which are driven from the compressor shaft, is slowed down, so that the controlling means rotate at a reduced speed. In this way it is possible to supply to the ejector more compressed air than will be needed for the jection of the charge. After the dispatch of compressed air to the ejector has been completed the ejector is connected by the controlling means with the atmosphere, so that the surplus air can escape and that the semi-solids can gravitate into the ejector as before.

Overloading of the ejector-tanks by the masses

entering from the feed pipe can be no matter of concern, as the pressure pipes run into the tops of the ejector-tanks at higher spots than the discharge branches of the feed pipe. If, nevertheless, some of the muds should enter the pressure pipes they will be blown back into the tanks by the compressed air as soon as the pressure pipes are connected by the controlling mechanism with the pressure side of the compressor. The lengthening of the pressure period caused by the slower rotation of the controlling means will have the result that, after the ejection of the charge from the tank is completed, an additional supply of compressed air will be forced into the ejector and into the discharge pipe. The fact that because of the reduced speed of rotation of the controlling means also the airing period will be prolonged is of no importance in the operation of the device.

The additional supply of compressed air forced into the discharge pipe at the end of each ejection forms in the discharge pipe behind each of the ejected charges an elastic cushion of air, which will not mix with the semi-solid and sticky masses and whose extension will depend upon the speed of rotation of the controlling means, so that the volume of these air-cushions can be regulated at the controlling means. Because of these alternate charges of semi-solids and compressed air the semi-solids will not be in frictional contact with the walls of the pipes throughout the entire length of the pipe line, so that the friction in the pipe line will be reduced considerably and that the pressure needed for operating the device will not be an excessive one. Another advantage of the arrangement resides in the fact that incrustation of the ejector tanks is sure to be avoided because of the cleaning action effected by the additional supplies of compressed air at the end of each ejection.

It is also possible to devise the arrangement in such a way that the ejector tanks are alternately connected with the pressure side and with the suction side of a compressor. In this case the invention contemplates to provide the controlling means with a pair of adjustable cams for operating a pair of valves arranged respectively in the path of the pressure pipe and the suction pipe and adapted to effect the connection of the ejectors with the pressure side and the suction side of the compressor in alternate succession. Here, again, the controlling means will be driven from the compressor shaft and the cams will be adjusted with respect to each other and with regard to prevailing conditions in such a position that the suction periods are accurately timed to ensure the complete filling of the tanks, while the pressure periods are so timed that after each ejection a cushion of air is formed behind the ejected charge. The valve arranged in the path of the pressure pipe will be opened by its appertaining cam at the moment the filling of the tank has been completed, and will be kept open until the tank has been cleaned out completely and until a cushion of air of a predetermined length has been dispatched into the discharge pipe behind the blown-out semi-solids. A speed-regulating mechanism (of the floating-regulation type—contrary to stepwise regulation) arranged between the compressor and the controlling mechanism will make it possible to increase or to reduce according to prevailing conditions the speed of the controlling means, i. e. their number of rotations in a unit of time. If the work accomplished by the air-pump is assumed to be a constant one it is self-evident that any modification of the speed of rotation of the controlling means must necessarily change the volume of the charge fed into the ejector tank. If the speed of rotation of the controlling means is accelerated, the length of the suction period will be correspondingly reduced, so that the tank will be incompletely filled. If, on the other hand, the speed of rotation is reduced, the end of the suction period will be reached at a later moment, so that more semi-solids will flow in and increase the volume of the charge.

It is obvious, therefore, that through the provision of the adjustable cams in combination with the speed regulating mechanism of the floating regulation type the controlling means of pneumatic ejectors operating with pressure-air and suction-air will be improved to such an extent that perfect adjustment to prevailing conditions is possible and that faultless operation of the device is guaranteed.

The invention will be best understood from the consideration of the following detailed description taken in connection with the accompanying drawings, forming a part of the specification, and in which similar reference numerals indicate like parts in the different figures, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appending claims.

In the drawings:

Fig. 1 is a diagrammatical illustration of the essential elements of the device;

Fig. 2 is a diagrammatical illustration of the compressor, the speed regulating mechanism, and the control box;

Fig. 3 is a detail sectional view of a control box, showing the adjustable cams and their position with respect to each other;

Fig. 4 is a detail sectional view of a controlling device used in cooperation with a speed regulating mechanism, showing how the valves are arranged in the path of the pressure- and suction-pipes and how they are operated by the cams;

Fig. 5 is a diagrammatical illustration of the cams of Fig. 4, showing the position of the cams arranged at an angle of 180° with respect to each other;

Fig. 6 is a diagrammatical illustration of the device in operation;

Fig. 7 is a bottom-plan view of the device illustrated in Fig. 6.

Referring now to the drawings in detail the reference numerals **1** and **2** denote the ejector tanks into which the semi-solids gravitate from the feed-pipe **3**, which is provided for each of the tanks with a slide-shutter **4** and a return-flap **5**. The semi-solids are discharged through the discharge pipes **6** provided with the return-flaps **7** and the slide-shutters **8**.

The compressed air is produced in a compressor **9** actuated by an electric motor **10**. The compressor **9** is connected with the control box **13** on the pressure side through the pipe **11**, and on the suction side through the pipe **12**, while the controlling device **13** is connected with the ejector-tanks **1** and **2** through the pipes **14** and **15**. The air pipes **14** and **15** are so arranged that at their spot of highest elevation they exceed in height the highest inflow-level of the semi-solids. By means of valves provided in the control-

ling device 13 the air pipes 14 and 15 are connected in alternate succession with the pressure-side of the compressor, i. e. with the pipe 11, so that through the surplus-pressure created in the ejector tanks the semi-solids are forced out of the latter. Hence, when the ejector tank 1 is connected through the air pipe 14 with the pressure pipe 11, the ejector tank 2 is connected via its air pipe 15 with the open air, and vice versa. The suction-pipe 12 is constantly kept open at the controlling device and also terminates in the open air. The controlling device 13 is driven from the compressor shaft 16, whereby between the shaft and the controlling device a speed-regulating mechanism 17 of the floating regulation type is arranged.

Fig. 2 shows how the controlling device, the speed-regulating mechanism and the compressor are arranged. Mounted on the compressor shaft 16 is a gear wheel 18, which via a gear wheel 19 transfers its rotary motion to the gear 20 of the speed-regulating mechanism 21, whose speed may be regulated with the aid of a regulating wheel 22. Arranged on the shaft 23 is a worm 24, which meshes with a worm wheel 25 mounted on the shaft 26 of the control box 13 for driving that shaft. The shaft 26 is provided with two cams 27 which are disposed at an angle of 180° with respect to each other and adapted to actuate valves which alternately connect the air pipes 14 and 15 with the pressure pipe 11 and with the open air, while the suction pipe 12 remains open constantly. For the sake of simplicity the two valves have not been shown in this figure. In order to ensure the connection of the suction pipe 12 with the atmosphere the invention contemplates to provide the pipe 12 with a branch 12′ in which may be arranged a slide 28, which will be kept open and thus guarantees the connection with the open air. But it is also possible to devise the construction in such a way that the suction branch of the air-pump 9, or the pipe connection to the controlling mechanism 13 terminates freely in the open air.

Fig. 3 shows a simplified construction of a controlling mechanism adapted to be used in combination with an ejector operated by air suction and air compression. The driving power derived from the compressor shaft 16 is transferred via the speed-regulating mechanism 17 (Fig. 1) to the gear wheel 29, which meshes with the gear wheel 30 mounted on the cam-shaft 31. The cam on the right 32 is arranged on the shaft 31, which latter is journaled in the casing 13′ of the controlling mechanism 13 and in the bearing 33. Mounted on the end of the shaft 31 is a coupling-member 34 which meshes with another coupling-member 35, which is likewise arranged on the end of a shaft 37 and secured in coupling engagement with the member 35 by the pressure of a spring 36. The shaft 37 is journaled in the casing 13′ and the bearing 38 and provided with a cam 39. The shaft 37 passes through the casing 13′ and carries at its free end a handle 40. The cams 32 and 39 are adapted to actuate the spring-loaded valves 41 and 42 of which in the embodiment illustrated in Fig. 3 the valve 42 is shown in closed position while the valve 41 is shown in opened position. In an arrangement of this type the air pipes 14 and 15 will be alternately connected with the pressure pipe 11 and with the suction pipe 12, in per se known manner.

In order to alter the position of the cams 32 and 39 with respect to each other it is merely necessary to disengage the coupling member 35 from the coupling-member 34 by pulling the handle 40 of the shaft 37 in outward direction against the pressure of the spring 36 and to rotate the shaft 37 and the cam 39 mounted on the latter through the necessary angle, whereupon the coupling member 35 may be permitted to reengage the coupling member 34 as before. In this way it is possible to adjust the position of the cams with respect to each other and with regard to prevailing conditions and to regulate the length of the pressure periods in such a way that after each completed ejection a cushion of air of a predetermined length is formed behind the blown-out semi-solids in the discharge-pipe.

A controlling device adapted to be used in combination with the speed-regulating mechanism 17 (of Fig. 1) has been illustrated by way of example in Figs. 4 and 5 of the drawings. A controlling mechanism like this is per se known. In Fig. 4 the reference numeral 24 designates the worm which meshes with the worm-wheel 25 of the controlling mechanism and thus rotates the shaft 26 on which are secured the cams 27 at an angle of 180° with respect to each other, as illustrated in Fig. 5. The controlling mechanism includes two pistons 43 and 43′ which reciprocate in the cylinders 44 and 44′ and which are provided with the piston-rods 45 and 45′. Mounted on the piston rods are the compression springs 47 and 47′ which at one end bear against the plates 46 and 46′ secured to the ends of the piston rods, and at the other end against the cylinder covers 48 and 48′. Secured to the ends of the piston rods are the rolls 49 and 49′, which are engaged by the cams 27. In the embodiment illustrated in Fig. 4 the cam-plate on the left is in its uppermost position enabling the compression spring 47 to lift the piston 43 into the position in which the pressure pipe 11 is connected with tank 2 through pipe 15, while simultaneously in the cylinder 44′ the branch leading to pipe 15 is closed up by the piston 43′, which at this moment has been forced by the cam-plate on the right against the pressure of spring 47′ into its lowermost position in which it connects the suction-pipe 12 through pipe 14 with tank 1. When after this the cam-shaft 26 continues its rotation through an angle of 180° the piston 43 will reach its lowermost position in which it connects the pressure-pipe 11 through pipe 14 with tank 1, while simultaneously the piston 43′ will rise to its uppermost position in which it connects the suction-pipe 12 through pipe 15 with tank 2.

The Figs. 6 and 7 show the device at a moment of its operation. The ejector tank 2 has just been filled, while the charge of tank 1 has just been blown out. But the connection between tank 1 and the discharge pipe 6 is still open, so that a cushion of air 50 will form in pipe 6 behind the charge of mud 51 that has just been ejected. A moment later the connection between tank 1 and the suction pipe 12 of the compressor will be established, so that a new charge of mud will flow into the tank, while at the same time the pressure pipe 11 will be brought in connection with the ejector tank 2 and admit to that tank a charge of compressed air to discharge the mud.

Instead of providing the device with return-flaps 5 and 7, it is also possible to use exclusively the slide-shutters 4 and 8, which in known manner may be controlled either electrically or hydraulically or by means of compressed air. If electrical controlling means are to be employed it is suggested to secure to the cam-shaft 26 (of

Fig. 2) an auxiliary shaft and to equip this auxiliary shaft with electrical contacts in such a way that the slide-cutter 4 of tank 1 is closed and the slide-shutter 8 of that tank is open when the charge of that tank is being ejected, while on the other hand slide 4 will be open and slide 8 will be closed when the filling of the tank takes place. The same would apply to the slide-shutters of tank 2. However, an arrangement like that is known to the art and therefore not illustrated in the present invention.

Before the operation of the lifting device is brought to a stop all of the elevated material should be discharged from the discharge pipe 6. For that purpose the slide-shutters 4 have to be closed, so that further semi-solids are prevented from being sucked or from flowing into the tanks 1 and 2. But in spite of the closing of the shutters 4 the operation of the plant is continued until all of the semi-solids are discharged by the air-pressure from the tanks and from the discharge pipe. While this discharge-operation is going on the slide-shutter 28 provided in a branch of the suction pipe 12 has to be open in order to enable the compressor to draw the pressure air direct from the atmosphere. At the same time the controlling mechanism should be adjusted in such a way that the periods of pressure are lengthened as much as possible, so that the cleaning of the pipes will be accomplished in a minimum of time. A manometer arranged in the path of the pressure-pipe 11 will indicate by sudden drop of the pressure when the discharge pipe has been emptied. After this the device can be stopped without danger for the discharge pipe to become clogged by the lodgment of dried up solid matter therein.

GEORG NEIDL.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

G. NEIDL

PNEUMATIC DEVICE FOR RAISING AND CONVEYING SEMI-SOLIDS

Filed Nov. 14, 1940

Serial No. 365,724

2 Sheets-Sheet 1

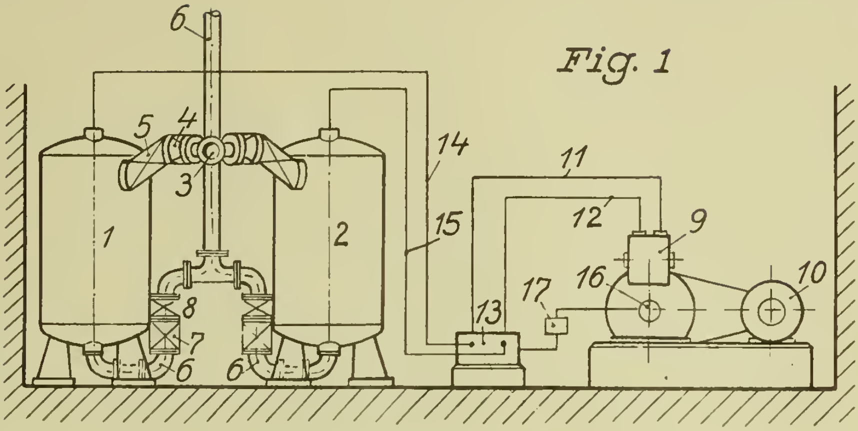


Fig. 1

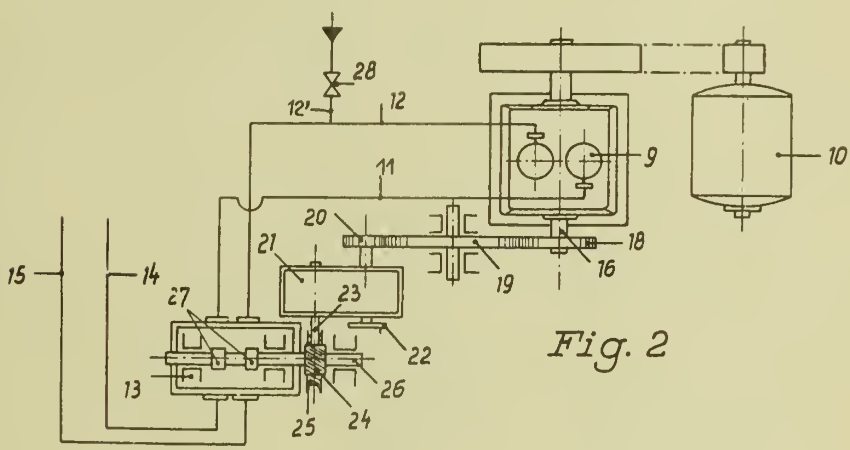


Fig. 2

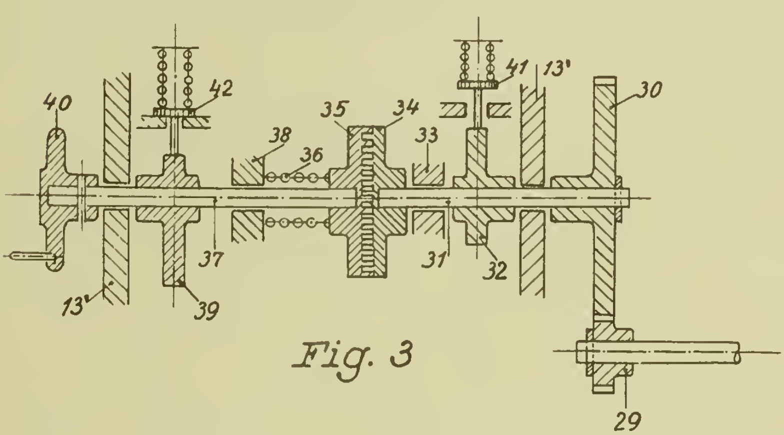


Fig. 3

Inventor:

Georg Neidl

By

ATTY.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

G. NEIDL

PNEUMATIC DEVICE FOR RAISING AND CONVEYING SEMI-SOLIDS

Filed Nov. 14, 1940

Serial No. 365,724

2 Sheets-Sheet 2

Fig. 5

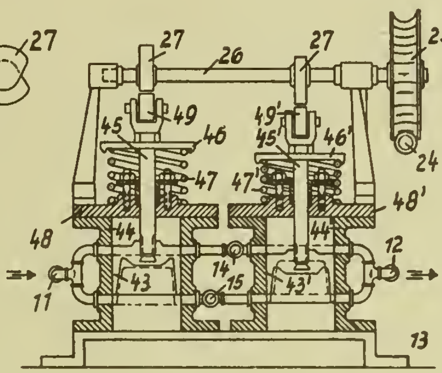


Fig. 4

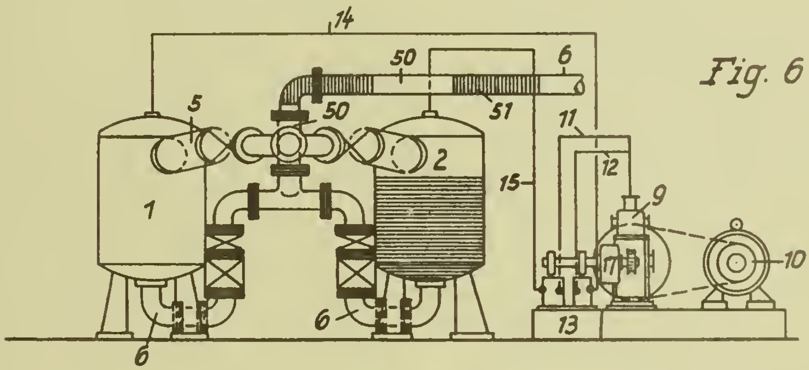


Fig. 6

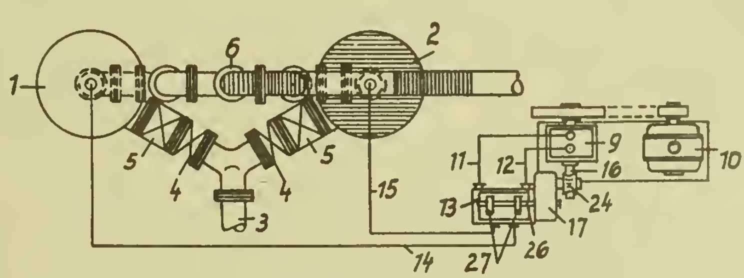


Fig. 7

Inventor:
Georg Neidl

By [illegible]
ATTY.

Published May 11, 1943 Serial No. 365,862

ALIEN PROPERTY CUSTODIAN

VITREOUS INSULATORS

André Laurent Camille Delloye, Paris, France; vested in the Alien Property Custodian

Application filed November 16, 1940

For the purpose of manufacturing units for insulating heat and sound by the aid of threads of glass or other vitreous substances the hanks formed by these threads are spread out in superposed layers, which are then heaped up until each unit is of sufficient thickness for providing the required degree of insulation. Since this manufacture is carried out by hand it is not possible to obtain a homogeneous product, for the degree of insulation, which is a function of the proportion between the quantity of glass threads and the quantity of air interposed between these threads per unit of volume, varies from point to point. Since the insulating power in such a unit does not exceed that of the zone at which the degree of insulation is weakest, it follows that the quantity of glass threads employed in the unit as a whole is much greater than the quantity really necessary for obtaining the same insulating power. To this disadvantage are to be added that of the cost of labour and that of the risks inherent in the manipulation of glass threads, which, when they break, are liable to pierce the skin, the eyes, and the respiratory organs.

The object of the present invention is to provide a method of manufacture which obviates these disadvantages. This method consists in cutting the hanks of glass threads in such a manner that the cut threads are of a substantially uniform and reduced length, then disentangling these cut threads in a current of fluid, and leaving the threads, thus disentangled, to settle out, thus forming a mattress or cushion, which is then dried and compressed in such a manner as to give it a thickness suitable for obtaining the degree of insulation required.

The invention further consists in the resulting new industrial product, the insulator for heat or sound or both, which consists of threads of glass or other vitreous substance, cut to a short and substantially constant length and agglomerated to form a uniform mixture, that is to say, a mixture in which the ratio between the quantity of glass threads and the quantity of air interposed between these threads is practically constant. The length of the cut threads, which may be reduced to less than one centimetre, depends upon the dimensions and the form of the insulating unit to be produced.

The invention likewise comprises the insulating units incorporating this novel product, and the plant enabling the said process to be carried out.

Plant for carrying out the process according to the invention is diagrammatically illustrated by way of example in elevation, partly in section, in the accompanying drawing.

This plant comprises a table 1, upon which are spread out the hanks of threads of glass or other vitreous material, in which the threads are arranged approximately parallel to one another, an endless belt 2 for conveying the hanks to a cutter 3, which cuts the threads into portions of the same length, and an inclined plane 4, down which these portions slide, to fall into a chamber 5 by passing through a charging door 6.

Compressed air is delivered tangentially to the lower part of the chamber 5 through a pipe 7 provided with a cock 8.

An evacuation pipe 9, which can be shut off by means of a valve 10, unites the conical upper portion of the chamber 5 with the likewise conical upper portion 11 of a reservoir 12, the bottom 13 of which is equipped with a tubular connection 14, having a valve 15, and a flared outlet 16.

The reservoir 12 may be filled with water or with some other liquid by means of a tube 17, provided with a cock 18. A pump 19 is connected to the upper part and to the lower part of the reservoir 12 by two tubes 20 and 21 respectively, so as to produce therein an upward circulation of water.

Below the flared aperture 16 are placed moulds 22 of a suitable form, which are movable upon wheels 23, and are provided with cocks 24, 25 and 26 at different levels for the discharge of water. A press 27 is provided for compressing the threads of glass which have been deposited in the moulds 22.

The apparatus hereinbefore described operates in the following manner: The speed of movement of the belt conveyor 2 and the cutting speed of the cutting machine 3 are so related to one another that the glass threads are cut to a uniform length, fixed in advance. The cutting is stopped when the lengths of thread have been accumulated in sufficient quantities in the chamber 5. The door 6 is then closed, and the air inlet cock 8 is opened, the valve 10 being closed. There is thus produced in the chamber 5 a whirling eddy of air, which disentangles the threads. The valve 10 is then opened, the reservoir 12 having been previously filled with water by opening the cock 18 and closing the valve 15. When all the threads, suitably disentangled, have been passed from the chamber 5 through the tube 9 into the reservoir 12, the valve 10 is closed, and the pump 19 is started so as to produce an ascending current of liquid in the mixture filling the reservoir 12. The operations of transporting the hanks,

cutting up the threads and feeding the chamber **5** may then be resumed. After completing the stirring of the threads in the liquid in the reservoir **12**, the mould **22** is placed underneath the aperture **16** of the reservoir, the pump **19** is stopped and the valve **15** opened. The glass threads then fall, with the water in which they were suspended, from the reservoir **12** into the mould **22**, and this water flows away through the cocks **24**, **25** and **26**, which are opened in succession from the lowest to the highest, so as to obtain a regular settling of the threads in the mould. The latter is then moved into a position underneath the press **27**, which compresses the threads deposited in the mould, until the totality of these threads has a predetermined thickness. The product is then dried.

To the liquid in the reservoir **12** there may be added a material such as sodium silicate, which is capable of subsequently forming a binding agent between the threads.

The discontinuous operations described above may be so modified as to render them continuous. Thus it is possible to cause the threads, as they pass through the reservoir **12**, to fall on to a plate or conveyor in such a manner so as to form a mattress or cushion, the degree of composition of which will be attained by the aid of a roller, which takes the place of the press **27**.

The treatment with water may moreover be omitted, provided the chamber **5** and the reservoir **12** are made of such forms and dimensions that the threads disentangled in the chamber **5** may be held in suspension in the reservoir **12**, and may fall slowly into moulds or on to the conveyors.

Finally, an analogous device may be provided for the treatment of threads of other materials, such as asbestos for example, the threads of glass and the threads of the other materials being projected simultaneously in predetermined proportions into the interior of a reservoir in which they are mixed together, and from which they are discharged for deposition in moulds or upon conveyors.

The product formed by the threads, cut, deposited and suitably aggregated, is then enclosed in the usual manner in covers made of linen, paper, cardboard or other materials, in such a manner as to form insulating units of suitable shapes and dimensions. It may furthermore be provided internally with insulating rods having a certain rigidity, with a view to enabling the insulating unit to oppose greater resistance to pressures tending to deform it, the ends of these rods admitting of being pressed against one or two more rigid external layers.

The product of the invention, as compared with known insulating products made of glass threads, presents the advantage of great homogeneity, that is to say, of constant proportions per unit of volume between the glass threads and the air or other gas interposed between these fibres. Thanks to this homogeneity, and to the uniform insulating power resulting therefrom, it will be possible, as stated above, to employ insulating units of less thickness, and to attain in this way an appreciable economy of material, while obtaining in all respects the same predetermined insulating power.

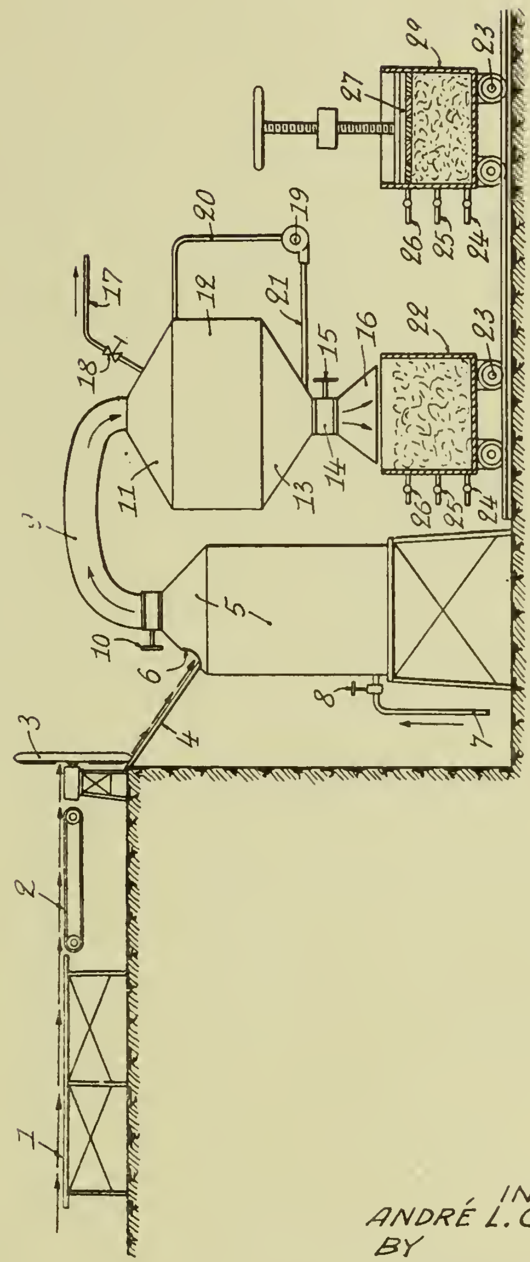
The specific gravity of these elements varies according to the initial compression to which the product according to the invention has been subjected.

ANDRÉ LAURENT CAMILLE DELLOYE.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. L. C. DELLOYE
VITREOUS INSULATORS
Filed Nov. 16, 1940

Serial No.
365,862



INVENTOR
ANDRÉ L. C. DELLOYE
BY
Richards & Geier
ATTORNEYS

Published May 11, 1943

Serial No. 366,470

ALIEN PROPERTY CUSTODIAN

METHOD AND DEVICE FOR MANUFACTURING DIAPHRAGMS

Günter Kämmerling, Berlin-Charlottenburg, Germany; vested in the Alien Property Custodian

Application filed November 20, 1940

The present invention relates to the manufacturing of diaphragms as used, singly, for instance in pressure metering devices or connected in pairs so as to form a diaphragm capsule for a variety of purposes. Such diaphragms are made of materials adapted to be plastically formed, preferably metal, and are usually manufactured by stamping. This is done in such a way that a disc shaped piece or plate is placed in a stamping tool of a form corresponding to the desired form of diaphragm, i. e. a tool the upper part of which is mostly provided with ring shaped ridges and grooves corresponding to respective grooves and ridges in the bottom part of the tool. Upon the lowering of the upper part, these ridges and grooves are stamped on the metal piece placed between the two parts so as to form a diaphragm having a corrugated cross section.

Such a manufacturing method is quite satisfactory for flat diaphragms and for such manufacture of material which may be deformed relatively easily. In the case of diaphragms of great depth, however, and even of flat diaphragms the method has the drawback that the outer rim thereof is strongly corrugated. The degree in which this phenomenon may be observed depends on the hardness of the material used, i. e. the harder the metal the most strongly marked is the corrugation at the rim. This drawback becomes more particularly noticeable where two diaphragms are connected and is due to the fact that the material in the stamping operation is drawn from the periphery towards the center of the disc. In this respect certain advantages are offered by a method according to which the diaphragm is not formed by stamping but by drawing. This method is only used for diaphragms of considerable depth. As in the stamping method, the work piece is disc shaped. It is placed in a drawing tool, the rim of the disc being gripped by a holder, and by means of a "drawing stamp" the material so held is drawn into a corresponding depression in the bottom part of the tool. As the trough shaped piece thus formed lacks stiffness, concentric grooves are usually stamped into the bottom thereof. In a known construction a ring is soldered into the inner edge of the diaphragm before the stamping of the grooves.

The invention consists in the use of a disc shaped or trough shaped work piece gripped tight at the rim being subjected to a combined drawing and stretching process. The difference of this method from the usual stamping method consists therein that here the material is deformed between free edges while according to the stamping method the stamping is not done between free edges but between two surfaces as for instance by a V-shaped stamp being pressed on to a correspondingly V-shaped depression.

By the method according to the invention flat or depressed diaphragms of equally good quality may be manufactured. Moreover the disadvantage that concave diaphragms frequently tear at the rim due to the tight gripping thereof is avoided. That cannot happen according to this method as the drawing and stretching is not effected from one single gripping zone toward the center but as it were between several gripping places which are formed by free edges. This involves a further advantage of the application of the inventive principle. Diaphragms manufactured by stamping have been exposed to the stamping pressure over their entire surface. Thereby tensions have been set up in the material which are only relaxed after a time and which cause changes in the instruments provided with a such diaphragms as to the zero position. In the diaphragms manufactured according to the invention only those parts which have been in contact with the tool edges have been affected by pressure, the intervening parts having merely been plastically deformed. Therefore the diaphragm manufactured according to the inventive principle due to their having been exposed to lesser pressures are subject to only immaterial changes compared to those manufactured by stamping.

If a disc shaped plate is used as primary work piece, it is nevertheless advantageous to give this a trough-like shape, which may be done by means of the same tool and in the course of the same working phase in which the combined drawing and stretching is done.

In the following the method according to the invention is further explained with reference to the accompanying drawing, of which

Fig. 1 shows a section of the tool used in the open position and

Fig. 2 the same in the closed position.

Figs. 3 and 4 represent different diaphragms manufactured by the tools according to Figs. 1 and 2.

In Figs. 1 and 2 the numeral **1** denotes the upper part of the tool, **2** the lower part of same. The upper part **1** is provided with the usual gripping arrangement, **3**. The parts required for the combined drawing and stretching operation are disposed on said gripping arrangement **3**, namely the upper part **4** of the holder and the tools **5**

and 6. The upper part 4 of the holder and the tools 5 and 6 are separated by plates 7 and 8 which serve a purpose described later on. The lower tool part possesses a construction corresponding to that of the upper part; it consists of the lower holder part 9 which is supported on a compression spring 12 by means of pins 10 and a pressure plate. In the initial position the lower holder is above, or at least level with the tool edges of the lower part. In the embodiment shown the lower tool part consists of three parts, namely the center part 13 which together with its screw piece 14 serves to secure the two outer parts 15 and 16 on the base plate 17. Here, too, the individual parts are separated by plates 18, 19 and 20.

The manufacturing method is the following:

The disc shaped plate 21, as seen from Fig. 1, is placed on the edge of the holder 9. When the press is set going, the upper tool part 1 approaches the lower tool part 2. In the first instance the upper part of the holder 4 becomes operative by gripping the plate 21 between its effective surface and that of the lower holder part 9. Affected by the compressing force the lower holder part moves downwardly due to the spring 12 becoming compressed via the pressure plate 11 and the pins 14. (Instead of a spring some other force produced either hydraulically or pneumatically may of course be used.) Thereby the other tool edges—5, 6 in the upper part and 13, 15 and 16 in the lower part—come into play. They deform the plate in a manner apparent from Fig. 2. The tool edge 16 serves to produce the trough formed diaphragm rim. The edge 5 is pushed down between the tool edges 16 and 15 causing the material to be drawn and stretched, and the edge 6 is pushed down between the edges 15 and 13 causing a corresponding deformation. In order to facilitate the drawing and stretching process the form of the tool edges is chosen so as to be less steep towards the periphery. For a better understanding of the drawing and stretching process described it may be observed that the deformation of the metal takes place between free edges in contradistinction from what happens in the stamping method, i. e. the material, for instance, contacts at the edges 5 and 15 and is stretched between these two edges.

The tool represented in Figs. 1 and 2 possesses a further advantage. As the tool edges are formed as cylindrical or shell shaped bodies separated by plates, preferably made of ground steel plate, it is possible by exchanging the plates in question by others of a different thickness to produce different diaphragms and moreover to compensate for slight deviations in work pieces.

Figs. 3 and 4 show diaphragms manufactured by means of the tool shown in Figs. 1 and 2. As the position of the diaphragms represented in the drawing corresponds to that of the tool shown in the first two figures, it is apparent how the diaphragms were produced. Thus to produce the diaphragm shown in Fig. 3 the tool edge 16 would have to be raised and the edge 5 pushed upwardly, the plate at 8 having been removed. To produce the diaphragm in Fig. 4 the tool edge 15 would have to be raised and the plate at 18 complemented by another. The center 13 and the tool edge 6 would have to be shifted correspondingly.

The tool shown in Figs. 1 and 2 naturally represents merely an example of the application of the inventive principle. Instead of supporting the holder part on a spring plate 11, it may of course be mounted in the way shown in Fig. 2. In this case it would be necessary to adjust the tool edges 13, 15 and 16 in working position only when the plate 21 has been placed in position, i. e. to provide a special drive for this latter. The depth to which—in this embodiment—the upper part is pushed down onto the lower part depends on the holder. By inserting a thicker plate at 7 the depth is reduced and if a thinner plate is inserted, the depth is increased. Naturally any other means may be used for determining the depth of impression.

GÜNTER KÄMMERLING.

PUBLISHED — G. KÄMMERLING — Serial No.

MAY 11, 1943. — METHOD AND DEVICE FOR MANUFACTURING DIAPHRAGMS — 366,470

BY A. P. C. — Filed Nov. 20, 1940

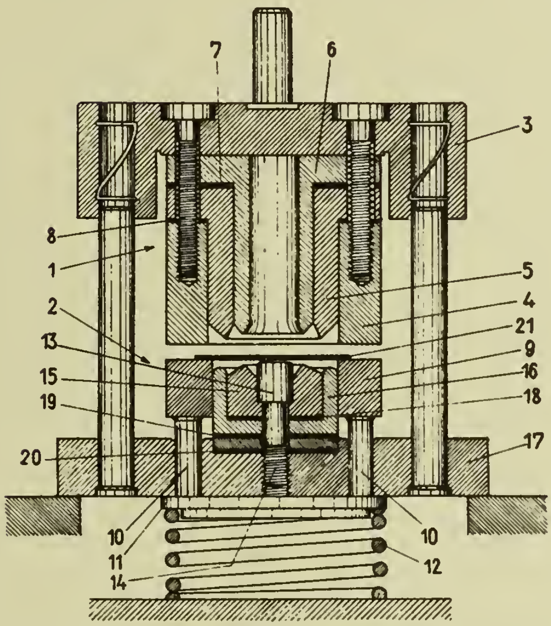


Fig. 1

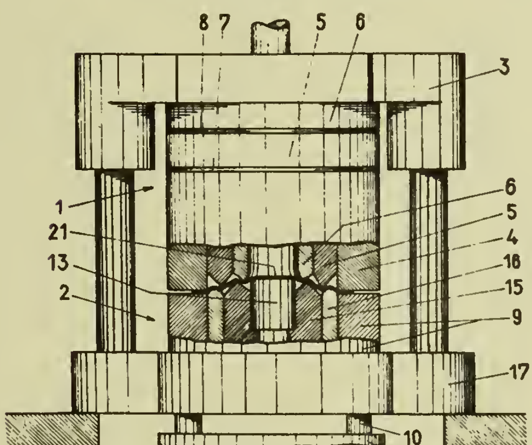


Fig. 2

Fig. 3

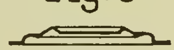


Fig. 4

Inventor:
Gunter Kammerling
By A. D. Adams

Published May 11, 1943 Serial No. 367,225

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF PROTECTIVE LAYERS ON OPTICALLY ACTIVE SURFACES

Gustav Joseph Weissenberg, Berlin-Mariendorf, Germany; vested in the Alien Property Custodian

No Drawing. Application filed November 26, 1940

The present invention relates to a process for the production of protective layers on optically active surfaces. By optically active surfaces are hereby to be understood the surfaces of optical lenses, prisms, plates etc., consisting of different sorts of glass or other transparent materials such as calcspar, fluorspar, rock salt, sylvine, quartz, quartz glass and similar minerals, or also of synthetic materials such as artificial resins, as well as optically active metal surfaces of silver, aluminium and the like, such as the surfaces of metal mirrors.

Such protective layers have the purpose to make optically active surfaces resistant against the influence of the atmosphere, as well as against chemical agents, such as acids or bases and the like and to protect them against mechanical damages.

Protective layers which can be used for optically active surfaces, especially for optical glass lenses consisting of highly sensible glass sorts, must fulfill a number of conditions. The layers must be transparent and may not possess colours within the range of the spectrum used. They may not influence the optical properties of the respective glass lenses and the like, i. e. they must be in general very thin. Nevertheless they must strongly adhere to the respective optically active surface and may not loosen under the influence of especially high or especially low temperatures or sudden temperature changes. Moreover they must possess such a hardness that the respective optically active surfaces can be cleaned in the usual way and by usual means without that scratches and the like result thereby.

It is known to coat optically active surfaces with protective layers of organic substances such as transparent artificial resins or varnishes. The principal disadvantage of such protective layers of organic substances lays in the fact that they have only a small chemical resistance; besides, protective layers of organic substances show after a certain time changes of colour and frequently become turbid, so that the effect of the optical devices produced thereby is lowered.

To produce protective layers on optically active surfaces according to the invention, these surfaces must be first thoroughly cleaned so that layers of dirt, especially layers of greasy dirt, are removed. After that they are wetted with the solution of a substance out of which an undissoluble compound of the general formula $SiO_2.x\,H_2O$, in which x means any number, can be precipitated. So for instance, they can be wetted with an aqueous solution of sodium silicate, obtained by dissolving an alkali silicate, containing 1 mol of alkali per 3,6 mols of silicic acid, in 28 l. of distilled water. The surfaces wetted with the solution of the silicate are for the precipitation of the silicic acid or the silicic acid hydrate, then preferably after a preliminary drying, treated with the solution of an anorganic acid, such as sulphuric acid, hydrochloric acid, phosphoric acid, nitric acid and the like, or with the solution of an organic acid, such as formic acid, acetic acid, propionic acid, lactic acid, oxalic acid, tartaric acid, citric acid, benzene sulphonic acid and the like or with the solution of an acid salt such as potassium bisulphate, sodium bisulphite and the like. When using polysilicates instead of simple silicates the precipitation of the silicic acid can be also obtained by means of organic solvents such as ethyl alcohol. The surfaces wetted with the respective silicate are subjected for so long a time and to so energetic an action of the above-named agents, until the whole silicic acid is precipitated. Afterwards the salts, produced out of the basic components of the silicate used and of the acid or the acid salt applied for the precipitation, are thoroughly washed out so that the protective layer remaining on the optically active surfaces consists practically only of silicic acid or of silicic acid hydrate. The wetting of the optically active surfaces with the solution of the silicate can be obtained, for instance, by immersion, sprinkling or spraying.

The silicic acid can be used also in an other form, so for instance, as silicon tetrachloride. The surface to be coated is, for instance, wetted with silicon tetrachloride. The precipitation of the silicic acid on the optically active surface is then obtained by treatment with water, alkali or the like.

Finally the silicic acid can be used also in the form of organic complex compounds, as for instance of dimethylamino guanidine silicate.

In accordance with the desired layer thickness the treatment according to the invention can be carried out once or several times; besides by several repetitions of the treatment an increased thickness of the protective layer can be also obtained by using appropriate concentrations of the solution with which the respective surfaces are wetted.

To enhance the mechanical resistance of the layers obtained on the optically active surfaces they can be subsequently submitted to a thermical treatment such as a heating at high temperatures, amounting, for instance, for articles of glass to 200–750° C. When the deposition of

the layers is obtained by several repetitions of the treatment according to the invention, then the heating is preferably carried out after each treatment.

The mechanical resistance, for instance the scratch resistance, of the layers obtained by the process according to the invention, can be greatly increased when dioxane or furane derivates, such as furfurol are added to the solutions with which the surfaces to be treated are wetted. So for instance, 10 cc of dioxane can be added to the above-named solution. Thereby the hardness of the layers is greatly enhanced.

The protective layers obtained by the process according to the invention have not only a strong adherence, but are also absolutely resistant against the action of the usual acids, with the exception of hydrofluoric acid and hot phosphoric acid, as well as against the action of the atmosphere. They are unsensible against the influence of temperature.

To ease the obtaining of protective layers of an absolutely constant thickness it is recommendable to centrifuge the surfaces wetted with the treatment solution before the precipitation of the silicic acid is carried out. For this aim the surfaces, wetted with the solutions of sodium silicate or the like, are in the wet condition transferred in a centrifuge. In accordance with its number of revolution and the duration of the centrifugal treatment, layer thicknesses of absolutely determinated value can be obtained.

The centrifuge used possess preferably exchangeable liners, which are provided with a greater number of devices to fasten the objects to be treated. The said objects are placed as far as possible from the axis of rotation of the centrifuge, to avoid that those points of them which are remotest from the axis are subjected to a far greater centrifugal force than the points, which are nearer the axis.

It has been found that it is favorable to enhance the mechanical effect of the centrifugal treatment by the addition of substances to the solutions with which the objects to be treated are wetted, which diminish their surface tension. So for instance, soaps, alkylated aromatic sulphonic acids such as isopropyl naphthalene sulphonic acid and other known agents for diminishing the surface tension can be added to the treatment solutions. When using the isopropyl naphthalene sulphonic acid the addition of 15 cc of a saturated solution per liter of the treatment solution has been found especially appropriate. At the application of such a solution the number of revolution of the centrifuge is preferably so regulated that the objects to be treated have a mean circumferential speed of between 10 and 100 m per second at a radius of the circuit of 20 cm. Hereby a duration of the centrifugal process of 1–3 minutes has been used.

GUSTAV JOSEPH WEISSENBERG.

Published May 11, 1943 Serial No. 367,723

ALIEN PROPERTY CUSTODIAN

FOILS FOR COATING PURPOSES

Otto Herrmann, Wiesbaden, Germany; vested in the Alien Property Custodian

No Drawing. Application filed November 29, 1940

The present invention relates to a compound foil suited as coating material.

The problem to provide various kinds of supports, such as tissue, paper or wood, with a coating by applying thereon a foil made of a suitable plastic material, exists already for a long time. However, foils which have to be useful as coating material must meet various requirements. First of all, the foil must possess a mechanical and chemical resistance and, if possible, it must to a large extent be resistant to heat. Furthermore, it is necessary that the foil can be applied with simple means smoothly and free from pores to all the various kinds of supports and that it can be tightly combined with said supports. The adhesion must be so good that support and foil cannot be separated by the action of water, oils, fats or the like. Moreover, it is desirable that the coating foil can rapidly be fixed to the support so as to enable a continuous operation. Furthermore, the coated material must not have any tendency to roll. The hitherto used coating foils or coating processes did, however, not satisfactorily fulfill these various requirements. The covering of tissue, paper, wood and the like with foils of plastic materials has, therefore, not yet attained any particular industrial importance.

The present invention relates to a foil which is particularly suitable as a coating material. This new material is a compound foil consisting of two layers of various super-polyamides. By the term super-polyamides there are to be understood, as is known, linear condensation products of a high degree of polymerization which are characterized by the —NHCO-groups contained in the molecule and are produced for instance from ω-ω'-diamines and ω-ω'-dicarboxylic acids or from amino-carboxylic acids or the lactames thereof. In such super-polyamides the melting point and the behaviour towards solvents and swelling agents may be influenced to a large degree by the selection of the starting materials used for their manufacture. It is possible to prepare super-polyamides which, if a suitable swelling agent is used, may be softened readily i. e. at a relatively low temperature, whereas, on the other hand, super-polyamides may be obtained which by means of the swelling agent applied may be softened with difficulty, i. e. only at a very high temperature or which are substantially stable to swelling agents. According to the present invention a compound foil is prepared from two layers of superpolyamides; one of the layers can be softened by means of a swelling agent under conditions at which the other layer still remains resistant with regard to its form.

A compound foil as herein described may be obtained by first preparing separately as independent foils the two layers of which the compound material is composed, and then combining the layers by means of a solvent, for instance ethylene chlorohydrine. If one of the super-polyamides or even both super-polyamides are readily soluble in a usual solvent, it may be advisable to pour one layer on to the other. The thickness of the compound foil may be kept very low; it may amount to less than 0,04 mm. If a high flexibility of the foil is desired, the compound foil must be made as thin as possible. The thickness of the difficultly softenening layer may be limited to 0,01 mm and, if required, to even less than 0,01 mm; any damage of said layer when the material is worked up has not to be feared. The readily softening layer is suitably somewhat thicker. In order to distinguish the difficultly softening side from the readily softening side of the compound foil, when using it in working, one of the two layers, suitably the readily softening layer, may be marked. Preferably a mat surface is given to the readily softening layer. This mat effect disappears during the coating process.

The coating process of the new compound foil occurs as follows: the readily softening layer of the compound foil and the support to be coated are superposed after having moistened the support or the layer named with an agent capable of allowing said layer to swell. The foil is then ironed on to the support by a hot process or it is compressed thereon by means of hot rollers. During this operation an intimate connection between support and readily softening layer of the compound foil immediately takes place, but the outside layer of the foil is not damaged or altered in any way. On suitably selecting the two layers of the compound foils there is no risk that the top layer of the coating material be impaired, even not in those cases where the operating temperature during the coating process is increased far beyond the necessary degree or the heating operation lasts essentially longer than it is necessary. By the coating process with the new compound foil good results are, therefore, attained even in those cases where the operating conditions prescribed are not exactly observed. In practice, this fact is very advantageous and operating is considerably simplified thereby.

The difficultly softening layer of the new compound foil may, for instance, be prepared from a

super-polyamide which has been obtained from the salt of hexamethylenediamine with adipic acid. This product has a relatively high melting point and cannot be softened by the usual solvents. It is also possible to use difficultly softening superpolyamides prepared from aminocaproic acid or caproic lactam. Foils of these super-polyamides are prepared by may of fusion. The foils may, if required, be stretched in one direction or in all directions. The readily softening layer used as adhesive substance in the coating process is advantageously made of mixed superpolyamides as they are, for instance obtained by condensing together at least two starting materials capable of forming super-polyamides, at least one of the starting substances, but suitably not all of the starting materials being amino-carboxylic acids or functional derivatives of amino-carboxylic acids. For this purpose there are for instance suitable the super-polyamides for the preparation of which a mixture of hexamethylene-diamine and adipic acid or a salt of these compounds on the one hand and ϵ-amino-caproic acid or the lactam thereof on the other hand have been used. Instead of adipic acid there may, for instance, have been used a functional derivative of said acid, for instance an ester, an amide or the anhydride. Instead of adipic acid another suitable dicarboxylic acid and instead of hexamethylene-diamine another suitable diamine may have been used. Such super-polyamides are preferably used for the preparation of which there have been applied from the diamino-salts of the dicarboxylic acids or the corresponding mixtures of free diamines and dicarboxylic acids about from a half up to twice the amount of the aminocarboxylic acid. The mixed super-polyamides thus obtained may, in general be softened with application of heat by means of aqueous aliphatic alcohols, i. e. readily accessible solvents which can be handled without any danger. Some of the mixed super-polyamides may even be softened, while heating, already with water alone. In the softened condition the mixed super-polyamides have a very strong adhesive power. They may be extremely tightly combined with supports consisting of tissue, paper, wood, or the like. Particularly good results may, for instance, be attained by using as adhesive layer of the compound foil a mixed superpolyamide which has been prepared from amino caproic acid and the salt of hexamethylene diamine with adipic acid, the amino caproic acid amounting to 35–70% of the condensation mixture. If the said compounds are employed in the proportion of 2:3 the coating process may be performed with the aid of aqueous ethyl alcohol of 20 per cent strength or an aqueous glycerin solution of 10 per cent strength. In spite of this behaviour the resistance of the mixed super-polyamide herein described to water is even so high that a separation between support and foil by treating the covered material with boiling water, cannot occur; the adhesion of the combined support and foil is likewise not impaired by the action of hydrocarbons, oils or fats.

The new compound foil is distinguished by a high mechanical and chemical resistance. It may be very rapidly and solidly combined with various kinds of supports, while applying simple adjuvants; a careful observation of exact operating conditions is not necessary. Inflammable solvents need not be used. With other respects the material likewise fulfils, as regards its properties, the conditions named above which in practice are required by a good coating material. It must be especially emphasized that on coating the supports with the new compound foil an absolutely satisfactory surface free from pores may always be guaranteed, even when very rough supports, for instance rough tissue have to be covered, this being due to the fact that the top layer cannot sink into the support or the rough surface of the support cannot press through the foil.

The following examples serve to illustrate the invention, but they are not intended to limit it thereto:

1. A foil of a thickness of 0.04 mm, obtained by the way of fusion process and prepared from super-polyamide which has been produced from caproic lactam is combined with another foil of a thickness of 0.03 mm, which has been prepared by casting an alcoholic solution of the mixed superpolyamide prepared from equal proportions of caproic lactam and the salt of hexamethylene-diamine with adipic acid, on a rough support, one side of the foil being mat. The two foils are combined by placing the first named foil which has been moistened with ethylene chlorohydrine to the smooth surface of the other foil and compressing both foils together by means of squeezing rollers. The compound foil thus produced is then dried on hot rollers. The finished compound foil is distinguished by the fact that in the presence of heat and with the aid of water as swelling agent it may be intimately combined with various kinds of supports. The layer of the mixed superpolyamide serves in this case as an abrasive layer. Webs of paper moistened for instance with water and a compound foil may be conducted together into a heatable calender, the temperature of the heated roller of which is at 150° C, so that this roller of the calender comes in contact with the paper. A paper is thus obtained which is covered with an intimately adhering lustrous coating of super-polyamide. If the temperature of the heated roller of the calender is raised beyond 200° C, or even to 300° C the same good results are attained. The coating material is, therefore, very insensitive to variations of the operating conditions. A tissue scarcely moistened with water may be combined in the same manner with the compound foil. Moistened plywood slabs may likewise be coated without any difficulty with the compound foil. In that case there is, however, operated in such a manner that the heated roller of the calender comes in contact with the compound foil. Instead of a calender a hot flat iron may be used for combining the compound foil with the various supports. If as a swelling agent aqueous ethyl alcohol of 20 per cent strength is used instead of water the combination of support and foil may be performed particularly rapidly and at a temperature still lower than that named above.

2. The superpolyamide obtained by the condensation of 3.5 parts of caproic lactam and 6.5 parts of the salt of hexamethylene-diamine with adipic acid is dissolved with application of heat in aqueous methyl alcohol. The solution thus formed is cast to a film of a thickness of 0.03 mm. A further solution of a mixed super-polyamide prepared with the same solvents—on preparing the said mixed super-polyamide the two aforenamed components having been applied in the proportion of 1:1—is cast on to the dried film so that a further layer of a thickness of 0.04 mm is produced. When applied for a covering process the latter layer serves as an adhesive layer. Various kinds of supports may be coated at a

temperature of about 100° C with the compound foil thus obtained having a thickness of 0.06 mm, after its adhesive side has been moistened with an aqueous ethyl alcohol of 20 per cent strength. Though the second layer of the compound foil, as regards its chemical composition, scarcely differs from the adhesive layer, it does not soften during said operation, even if a temperature far beyond 100° C is applied. The compound foil may be combined with supports consisting of paper, tissue or wood in the same manner as described in example 1.

3. A foil of a thickness of 0.01 mm is prepared in the following manner from superpolyamide obtained by the condensation of the salt of hexamethylene diamine with adipic acid: by a mechanical process the super-polyamide is given the desired shape at a temperature of about 280° C to 290° C, while excluding oxygen; the foil obtained is then dilated by a stretching process either in one direction or in all directions. The foil is then combined with another foil having a thickness of 0.05 mm, said latter foil having been prepared by casting from a mixed super-polyamide from 4 parts of caproic lactam and 6 parts of the salt of hexamethylene-diamine with adipic acid. The two foils are combined with the aid of ethylene chlorohydrine. The last-named foil serves as an adhesive layer when the material is applied. The compound foil thus made may be combined by means of aqueous ethyl alcohol of 20 per cent strength or an aqueous glycerin solution of 10 per cent strength, with application of heat, with various kinds of supports. Since the adhesive layer is relatively thick, support and foil are intimately united even in those cases where the support to be covered has a rough surface. Since, on the other hand, the layer of the compound foil not softening during the combining process is very thin, materials which possess a particularly high flexibility are obtained on using said compound foil for coating tissue. Pure ethyl alcohol may likewise be used as a swelling agent during the coating process. It is, however, suitable to operate with aqueous incombustible alcohol. A tissue which has been coated with the compound foil herein described may be boiled with water and the super-polyamide coating is neither separated nor damaged thereby.

OTTO HERRMANN.

Published May 11, 1943

Serial No. 368,293

ALIEN PROPERTY CUSTODIAN

INTERNAL COMBUSTION ENGINES

Werner von Mallinckrodt, Stuttgart-Bad Cannstatt, Germany; vested in the Alien Property Custodian

Application filed December 3, 1940

The invention relates to an improvement of internal combustion engines and an improved method of operation of such engines.

One object of the invention is a decrease of the losses arising from the throttling of the charge within the cylinder and combustion space of engines with divided combustion space, but without giving up the advantages of such engines. Furthermore, the invention aims at a better combustion, a higher medium pressure, a higher output, a lower fuel consumption, and more favorable thermic conditions of the piston and the walls of the combustion space.

One feature of the engine and the method according to the invention consists in the fact, that during the greater part of the piston stroke a part of the combustion space receiving the fuel or at least a part of the fuel is in not-throttled or in relatively little throttled connection with the cylinder space, and that only near the upper dead centre position of the piston, i. e. at the end of the compression stroke, this partial space will be throttled or additionally throttled specially by the piston, in comparison to the rest of the combustion space, so that a substantially ring shaped throttling connection remains between the two part-spaces of the combustion space. This substantially ring shaped throttling connection may be formed either by means of a ring shaped, substantially radially directed throttle slit or by means of substantially radially and circularly arranged separate openings or the like. Furthermore the throttling connection may be preferably formed on the one side immediately by corresponding walls of the cylinder head or of the part-space receiving the fuel, and on the other side by the piston. The piston may preferably serve as impact face for the fuel in order to distribute it after deviating it through the substantially ringshaped throttling connection into the rest of the combustion space. In a particularly advantageous type the latter is formed by a recess in the piston, preventing a striking of the fuel upon the cylinder wall, but allowing simultaneously an effective mixture of air and fuel.

The exceedingly good combustion, the high medium pressure, the high output and the exceedingly small fuel consumption (down to 150 grammes per HP-hour) may be explained by the following circumstances.

In consequence of the short time throttling effect between the injection space and the rest of the combustion space at the approach of the piston to the upper dead centre, and in consequence of the otherwise comparatively unthrottled connection between the two spaces, the generally underrated pumping losses of the piston will be effectively diminished.

The deviation of the fuel mixture makes a uniform distribution of the fuel over the main combustion space possible, so that the entire air contained in the combustion space will be utilized for the combustion, the circular throttling slit guaranteeing a sufficient pressure for an effective spraying into the injection space. By the application of the piston recess the fuel is furthermore prevented on one side to strike the cylinder wall and thereby to cause deposits and a smoky exhaust, and on the other side by these means an advantageous whirling in the main combustion space may be produced by the fact that the air, displaced over the outer piston rim, executes a torus-like whirling motion above the piston recess which may be still increased by the contents of the chamber emerging through the ring shaped slit.

The fuel cone striking in full width the piston bottom without, or without essential preceding throttling, the effect of the burning jet onto the piston bottom is distributed onto a comparatively large surface. The piston will also be stressed thermically only comparatively little by the fact that the flame of the fuel mixture, when striking upon the piston, is still in throttling connection, compared with the main combustion space, and consequently in want of air. Therefore the flame is less hot when striking upon the piston bottom in the upper dead centre than with the well known machines in which the fuel strikes the projections of the piston only after passing through a throttling connection within the main combustion chamber.

When the fuel crosses the injection space without striking upon hot insertion parts, a further danger of burning or scaling of such parts or of a cracking of still liquid fuel parts may be avoided to great extent. The wall of the intake channel eventually protruding into the main combustion space may be made integral with the wall of the cylinder head by means of welding or may be formed by a special insertion piece which may be more or less isolated against the cylinder wall. A protruding of the intake channel until near to the bottom of the piston recess may be of advantage.

Furthermore the starting capacity of the engine may be improved by the fact that on the one hand the throttling of the air entering the injection chamber during the compression stroke is

only small, so that only small losses will occur by the cooling of the air, and that on the other hand the fuel will partly come directly from the injection nozzle into the hotter air prevailing above the piston bottom in the cylinder space, or the main combustion chamber.

Of further importance is under circumstances the arrangement of the injection nozzle in such a way that a sufficient injecting length i. e. a distance of sufficient length between the nozzle and the piston bottom exists. This distance is preferably of such length that the fuel, when striking the piston bottom, is in preparation for the ignition or partly in a state of burning, on the other hand however the aimed at impact effect of the fuel jet at the impact face, for instance the piston bottom, is obtained. As a rule the distance between the mouth of the injection nozzle and the piston bottom will be about the size of half of the cylinder diameter.

In order to have a sufficient quantity of air in the injection chamber for producing a partial ignition and a sufficient rise of pressure in it, the injection chamber may comprise in a way of a pre-combustion chamber, for instance an enlarged space next to the injection nozzle to which joins the intake channel receiving the fuel jet. Eventually however the injection chamber may consist of a space in form of a channel of substantially uniform diameter, specially if this is sufficiently wide for receiving the required quantity of air.

The width of the circular slit for the sizes of aeroplane and automobile engines amounts to about 2–4 mm.

The injection chamber is generally arranged substantially central to the cylinder axis or the main combustion chamber, other arrangements being however possible. So for instance in a special type of the invention the injection chamber in the upper dead center being connected by a narrow ring shaped slit with the remaining combustion space is arranged eccentric and slanting to the axis of the cylinder. This arrangement is specially of advantage for smaller engines of higher speed, having only two valves each in a cylinder head, for instance an inlet and an outlet valve. By the lateral and slanting arrangement of the injection space, this space requires little room so that the valves may obtain a sufficiently large cross section, and the cooling of the valves or the walls of the injection chamber will not be lessened. If the injection chamber is at the same time in the shape of a channel and without an essential enlargement, this chamber will require still less space. Simultaneously the advantage of a diminished surface of the injection chamber will be reached.

The injection space may for instance discharge into an eccentric recess in the piston bottom, flatly extending for instance towards the opposite side. In this case the fuel which is injected longitudinally into the injection chamber strikes upon the piston bottom and an angle and is distributed according to this angle, from the striking place substantially towards the side of the cylinder centre, so that also in this case a substantially uniform distribution of the fuel across the main combustion chamber is reached. The flat extending of the piston recess towards the side opposite to the combustion chamber in this case is generally without drawback, as in consequence of the increased distance between the mouth of the injection space and the opposite side of the cylinder wall, a striking of liquid fuel onto this wall is not to be apprehended.

The injection chamber may be enclosed entirely or partially by a lining which may simultaneously contain the mouth of the injection chamber, protruding into the main combustion chamber. This lining may, according to the required heat derivation by means of isolating slits or isolating spaces be entirely or partially separated from the wall of the cylinder head.

The ring shaped slit formed in the upper dead centre may have a uniform width of slit over its circumference. The width of the slit may however be varying specially if the injection chamber is arranged eccentrically, if for instance the end face of the wall of the injection chamber protruding into the piston recess shows a certain incline to the piston bottom, so that a slit is produced having a greater width towards the side of the cylinder axis than towards the side averted from the cylinder axis. By these means the fuel quantity passing through the respective cross section of the ring shaped slit is accounted for.

In the accompanying drawing four types of my invention are illustrated in the Figs. 1, 2, 3 and 4.

In Fig. 1, in the cover *a* of a cylinder *b*, centrally above the piston *c* an injection space in the manner of a pre-combustion chamber is provided. In the mouth of this pre-combustion chamber a cylindrical insertion *e* is applied which in the case illustrated is screwed into the cylinder wall and contains a cylindrical discharge channel *f*. This insertion protrudes with its lower end *e'* above the wall *h* of the cylinder cover, limiting the main combustion chamber *g*, into the main combustion chamber and is horizontally cut off at its free end. Axially to the discharging canal *f*, above the pre-combustion-chamber, the injection nozzle *i* is inserted into the cylinder head.

The bottom of the piston *c* shows a recess *k* in the shape of a flat trough extending towards the piston rim *l* in such a manner that in the upper dead centre between the lower end *e'* of the insertion and the bottom of the piston recess a narrow ring shaped slit *n* is formed. For deviating the fuel or fuel mixture a deviating cone *o* may be provided at the bottom of the recess. The inlet and outlet valves indicated at *p* are preferably arranged above the piston recess. The interior diameter of the insertion *e* is so dimensioned that the fuel jet leaving the nozzle *i* after having crossed the pre-combustion chamber *d*, and here being mixed with air, and eventually being partly ignited, practically passes unthrottled through the discharging channel as indicated by the drawn course of the jet. The throttling required at the beginning of the combustion stroke ensues through the ring shaped slit, the width of which may be controlled by means of an axially adjustable arrangement of the insertion. Through the ring shaped slit the fuel mixture is distributed along the piston bottom into the recess *k* and the main combustion chamber *g*, without coming direct in contact with the cold cylinder walls. By these means and by the displacement of the air above the piston rim *l* when approaching the upper dead centre a torus-like air motion is effected in the main combustion chamber shown in the drawing by a dotted line, which eventually may still be increased by a corresponding shape of the wall *h* of the cylinder head.

For engine sizes in use for aeroplanes and automobile motors a flat recess with a bottom diam-

eter of about 60 to 80% of the cylinder diameter and a depth of about 10 mm. has proven favorable. Preferably the ring shaped slit end has a width of 2–3 mm. and should not be larger than 4 mm. in the upper dead centre of the piston. The distance of the nozzle mouth from the piston bottom corresponds in its size about to half the cylinder diameter, and the diameter of the discharge channel *f* to at least a fifth, and its length to about half this distance.

The insertion *e* may be put into the cylinder head without special isolation. Eventually the bottom of the piston recess may be raised in its centre so that the slit is formed between this raised portion and the lower end of the discharge channel. The main combustion chamber may also be formed mainly by a corresponding cavity made in the cylinder head instead of the recess in the piston bottom.

Preferably the ring shaped slit is directed horizontally outward. Eventually it may however be directed slantingly downward or slantingly upward if the piston bottom is formed correspondingly. Furthermore the ring shaped slit may under circumstances be divided into single apertures, by means of ribs arranged in the piston bottom, or it may have different widths on its circumference. The indication of a substantially ring shaped throttling connection should comprise all these forms.

With the type of the invention according to Fig. 2 the injection space *f* in the cylinder head *a* is arranged slantingly and eccentric to the cylinder axis. Near the injection nozzle *i* it has an enlargement *d* in the way of a pre-combustion chamber which eventually may be omitted by the fact that the injection space from the nozzle onto the discharge into the main combustion chamber has a uniform cross section. The narrow part of the injection space is surrounded by a lining *e* which is inserted tight fitting or with play, into the corresponding bore of the cylinder head, the lower end *e'* of which protrudes into a recess k_2 of the piston *c* and is slanting in such manner, corresponding to the bottom of the piston recess, extending flat towards the opposite side, that in the upper dead centre of the piston a narrow ring shaped slit end is produced between the end face of the lining *e* and the bottom m_2 of the recess. As shown, the slit *n* may be wider on the side adjacent the cylinder axis than on the opposite side.

The fuel is injected through the injecting nozzle in axial direction of the channel shaped injection space under an angle onto the bottom m_2 of the piston recess, after which the fuel being partly in burning state distributes through the narrow ring shaped slit *n* into the main combustion chamber, and that substantially towards the side of the cylinder axis. As for the rest, the manner of operation for this type, which is given by way of example, is substantially the same as explained for the arrangement according to Fig. 1.

An incandescent ignition plug *q*, serving for the start may be omitted under circumstances, as the starting of engines according to the invention is substantially facilitated, also when the engine is in cold condition.

The arrangement with eccentric and slantingly arranged injection space is specially meant for such engines which have only a single inlet- and outlet- valve *p*. The eccentric and slanting position has, as mentioned above, in this case the advantage that there is enough space for the arrangement of sufficiently large valves.

Specially such an arrangement is of advantage for engines of smaller dimensions, if eventually it may be applied to engines of larger dimensions.

The type of the invention according to Fig. 3 is distinguished from the one according to Fig. 1 substantially by the fact that the piston has a ring shaped recess m_3, so that within same an elevation *r* is formed serving as impact face for the fuel injected from the nozzle *e* through the pre-combustion chamber *d* and the channel *f*. The impact face may again be provided with a deviating cone o.

The slit *n* is formed by the endwall *e'* of the insertion *e* and by the elevation *r* of the piston. While with a shape m_3 of the recess the main combustion chamber is crossed by the fuel deviated at the impact faces *r* or o substantially in radial direction, the recess form may also be adapted to great extent to the fuel jet deviated in outward direction.

As for the rest, corresponding parts are designated with corresponding reference characters like in the Figs. 1 or 2.

The type of the invention given in Fig. 4 is distinguished from the one according to Fig. 3 substantially by the fact that the ring shaped slit *n* is directed not exactly radially in outward direction but somewhat slanting towards below. For this purpose the end edge of the extension *e'* of the insertion *e* is beveled a little conically and the deviating cone o is shaped correspondingly. The piston recess m_4 is deepened by and by from the cylinder axis towards the circumference and is adapted substantially to the fuel jet leaving the ring shaped slit *n*. The insertion *e* is provided with teeth *e''* engaging corresponding teeth of an insertion d_1 forming the chamber *d*. By changing the screwed position *e* or d_1 the width of the slit *n* may be changed. The insertion d_1 may be locked against turning in the cylinder head by any suitable way and may at the same time surround the injecting nozzle as shown in the type according to Fig. 2.

The features of the type according to Fig. 4 may be for example applied onto the types or embodiments of the invention according to Figs. 1, 2 or 3, such as, on the whole the features of the single types may be interchanged each other.

Furthermore, for instance, the channel *f* may be of smaller diameter as shown so as to form a first throttling connection between the partial combustion space *d* and the partial combustion space *g* or the cylinder space. The split *n* may be, in this case, a second or additional throttling connection. However, in other cases, it may be the only throttling connection between the two partial combustion spaces, for instance a pre-combustion or injection space and the main combustion or cylinder space.

Furthermore, the partial combustion space receiving fuel may be formed by a chamber arranged in the piston, in which for example the fuel may be injected from the cylinder head. Also, the invention is not restricted to such engines, in which the whole fuel is injected or otherwise introduced into one partial combustion space throttled from the remaining combustion space in the upper dead center position of the piston. Under circumstances, fuel may be also injected or introduced into another partial combustion space.

WERNER VON MALLINCKRODT.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

W. VON MALLINCKRODT

INTERNAL COMBUSTION ENGINES

Filed Dec. 3, 1940

Serial No.

368,293

Fig. 1.

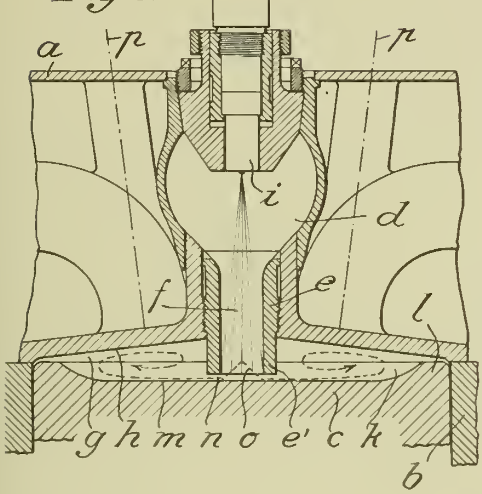


Fig. 2.

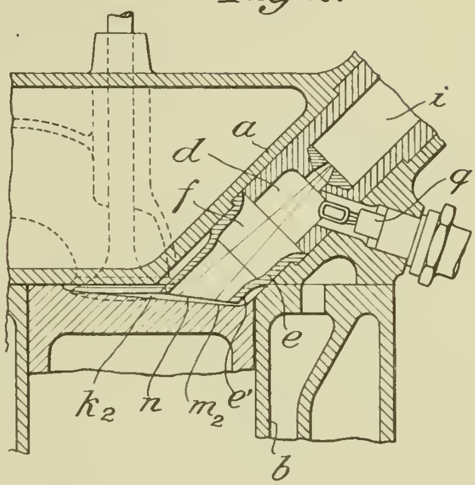
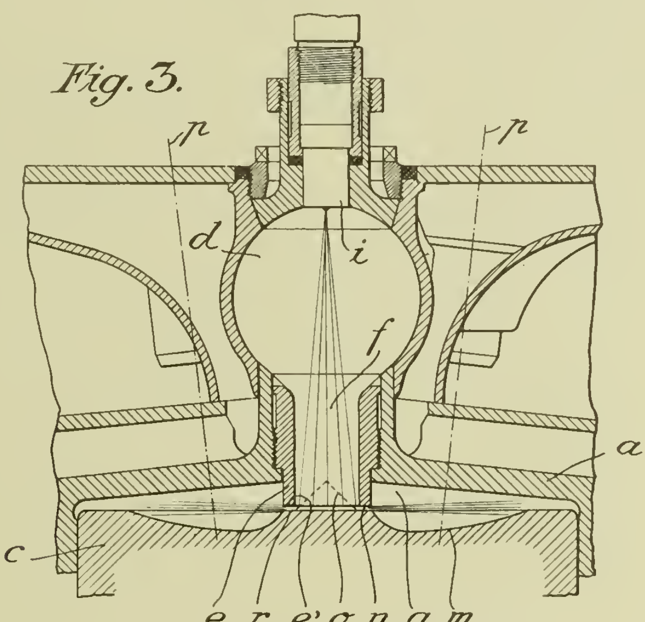


Fig. 3.



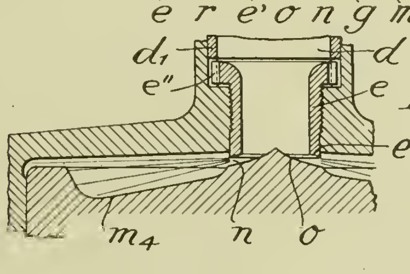


Fig. 4.

INVENTOR

Werner von Mallinckrodt

BY A. A. [signature]

[signature]

ATTORNEYS

Published May 11, 1943

Serial No. 368,502

ALIEN PROPERTY CUSTODIAN

PROCESS FOR PRODUCING AN ALUMINIUM-COATED METAL ARTICLE IN WHICH MAGNESIUM FORMS THE BASE METAL

Eduard Nachtigall, Bitterfeld, Germany; vested in the Alien Property Custodian

No Drawing. Application filed December 4, 1940

This invention relates to improvements in metal-coated metal articles, and particularly articles, in which the base metal consists of magnesium or a magnesium base alloy.

In view of the comparatively low resistance of magnesium and magnesium base alloys to corroding agents, various methods have been suggested for applying protective coatings to articles made therefrom. In dealing with magnesium and magnesium base alloys in sheet form, it has e. g. been attempted to plate the products with magnesium base alloys of comparatively high chemical resistance. Since, however, all magnesium base alloys afford a pure resistance to corrosion, a plating of this kind is still far from satisfactory.

It is desirable that a metallic coating, besides affording sufficient protection to the base metal from the action of corroding agents, also be mechanically resistant and cling tenaciously to the base metal on to which it is plated. The present invention aims at producing a metal-coated metal article in which magnesium or a magnesium base alloy forms the base metal and which will comply with the aforesaid requirements.

Attempts to apply aluminum or an aluminium base alloy directly on to the body of magnesium or magnesium base alloy have failed, since the adhesion to the base metal is insufficient. I have, however, found that, by the interposition, between the aluminium or aluminium base alloy (the latter hereinafter simply being included in the term "aluminium") outer layer and the magnesium or magnesium base alloy (the latter hereinafter simply included in the term "magnesium") body, of an intermediate layer consisting of a metal or alloy capable of alloying both with magnesium and, at least in the presence of magnesium, also with aluminium, then a metal article is produced having a coating of aluminium which offers a comparatively high resistance to corroding agents, while, at the same time, being mechanically resistant and not liable to peeling off.

Examples of metals suitable for forming the intermediate layer are zinc, tin, cadmium, lead, and antimony, and also alloys of these metals. The intermediate layer is preferably applied to the base metal by the well known spraying (metallic atomisation) process, although other means may be employed: thus it is also possible to apply the intermediate layer on the base metal in the form of a foil.

In accordance with the invention, the base metal covered with the intermediate layer is subjected to a short heating preferably at or slightly below the temperature of the eutectic between the base metal and the metal constituting the intermediate layer, so as to cause at least part of the metal forming the intermediate layer to alloy with or diffuse into the base metal, whereby the intermediate layer is keyed in a reliable manner on to the latter, whereupon the outer layer consisting of aluminium is applied in any convenient manner, such as by pressing or rolling aluminium foil on to the workpiece; the outer layer may even be applied in the molten form, e. g. by quickly dipping the workpiece already provided with the intermediate layer in a bath of molten aluminium or by spraying, a manner of working which is particularly useful in the case of workpieces of irregular shape such as castings. During or following such application of the outer layer, the workpiece is preferably again heated for a short time, e. g. by shock-heating or by passing an oxy-hydrogen blow-pipe flame over the workpiece, so as to facilitate the formation of an alloy between the intermediate layer and the inner surface of the outer layer by superficial melting or by diffusion.

In certain cases, viz. when diffusion of the metal forming the intermediate layer into the basic metal as well as into the outer layer of aluminium can be caused to take place at one and the same temperature, it is possible to perform the aforesaid two separate steps simultaneously. In such cases, in accordance with the invention, the intermediate layer is first applied to the basic magnesium, and the outer layer of aluminium is then immediately applied on to the coated article thus obtained, whereupon the whole composite article is subjected for a short time to the temperature at which diffusion of the intermediate layer will take place in an inward and in an outward direction. Preferably, this is done by hot rolling the composite article, whereby a yet more reliable bondage between the base metal and the various layers is attained.

According to a further modification of the present invention, the metal forming the intermediate layer may be first applied both to the magnesium workpiece to be plated and to the aluminium intended to form the outer coating, whereupon the aluminium provided with the metal coating is placed on the workpiece to be plated in such a manner that the layers of the metal forming the intermediate layer contact, whereupon the whole article is subjected to heating and compression, e. g. by hot rolling.

Example

A band consisting of a magnesium alloy which contains 8 per cent of aluminium and 0.5 per cent of zinc is uniformly roughened by sand blasting on the surface to be plated and then coated with a thin foil of zinc. The surface is then exposed for five minutes to a temperature of 340° C. in an inert atmosphere, e. g. nitrogen. In a similar manner a strip of pure aluminium intended to form the outer plating is coated on one side with a foil of zinc; in this case an annealing temperature of 380° C. for the diffusion is maintained. The zinced side of the strip of pure aluminium and the zinced surface of the band are then superposed and the strip is rolled on to the band at a temperature of 340° C. The plating firmly adheres to the surface of the workpiece whereby the latter is reliably protected against corroding actions.

EDUARD NACHTIGALL.

Published May 11, 1943 Serial No. 368,540

ALIEN PROPERTY CUSTODIAN

TRANSMISSIONS FOR MOTOR VEHICLES

Karl Maybach, Friedrichshafen, Bodensee, Germany; vested in the Alien Property Custodian

Application filed December 4, 1940

My invention relates to transmissions for motor vehicles and has special reference to transmissions including a hydraulic torque converter or a plurality of such converters. It is of special importance in heavy vehicles driven by internal combustion engines.

In transmissions of this kind it is aimed at to have a high secondary turning moment with low numbers of revolutions, so as to get high tractive forces when starting. Thus it is possible that extraordinary high stresses are created in the members of the transmission which may afford greater dimensions of such members and thus make them extremely heavy; and at the wheels of the vehicle the friction limit may even be exceeded.

According to my invention these disadvantages are avoided by providing means preventing increase in motor output over a certain small period when starting, for example for speeds up to three miles per hour. Consequently the value of the secondary turning moment is adequately limited and practically held constant over the aforementioned period and the stresses of the transmission elements remain within admissible limits.

For this purpose I prefer to provide a device which operates in dependence on the speed of the vehicle, that is in dependence on the revolutions of the out-going shaft of the hydraulic torque converter or of the shaft driving the wheels of the car.

All this will be understood best when having reference to the drawings which represent an example embodying my invention.

Fig. 1 is a diagrammatical side view, partly in section, of the driving machinery of a railroad motor car, some parts being shown on an enlarged scale.

Fig. 2 is a like view of a detail but different from Fig. 1.

The internal combustion engine **1** is provided with any normal fuel intake **2** adapted to be operated by means of lever **3**, rod **4** and device **41**, which may be made to work automatically in any well known manner (not illustrated). On the outgoing motor shaft **42** fly wheel **5** is situated. There may as well be inserted a friction clutch **43**, instead or in addition, as represented in Fig. 2. Shaft **42** then leads to a hydraulic torque converter **6** which on its out-going right hand side has shaft **14**. To this shaft **14** driving shaft **8** is flexibly connected by means of a universal joint **7**. Shaft **8** at its right hand end is provided with bevelled gears for driving the axle **10** with wheel **11** thereon.

There is a pinion **12** rigidly connected to shaft **14** and in mesh with pinion **13** which again is in driving connection with a centrifugal governor **15** adapted to act on piston **16** inside of cylinder **20** against the pressure of compression spring **19**. Piston **16** has a cross channel **17** and a longitudinal channel **18**, this latter channel **18** connecting cross channel **17** to the space to the right of piston **16**. An oil pump **40** driven by the engine **1** tends to press oil through tube **21** which at **24** opens into cylinder **20**. Another opening **25** is situated close to opening **24**, but the distance between these openings is so chosen that cross channel **17** in piston **16** may be either in connection with one or the other of these openings **24** and **25**. From opening **25** the oil may escape outward by means of tube **22**, as indicated by the arrow.

There is a third opening **26** in cylinder **20** situated opposite to the upper end of cross channel **17**, and connected to this opening is tube **23** leading to cylinder **27** in which piston **28** is adapted to slide under the oil pressure from the space **33** above the piston and the re-action of compression spring **29**. A bracket **30** or the like prevents piston **28** from being moved to the top of the cylinder **27**; in the idling position, when there is no oil pressure inside of space **33** piston **28** under the pressure of spring **29** bears against this bracket **30**.

A rod **31** is in rigid connection with piston **28**, and at its upper end it is provided with knob **32** or the like against which the right hand end of lever **3** may bear when this lever is operated by means of rod **4** after it has travelled over a certain way.

The different parts of the device are in the positions represented in Fig. 2 when the engine **1** is not running. When it was started the fuel admission is limited because lever **3** with its right hand end after a certain way bears against knob **32**. Thus the engine is prevented from developing its entire output when the car is started, but later on, when the number of revolutions of the driven shaft **14** increases which means that the car begins to move, the carburetor is allowed to be opened to a greater extent, in dependence on the speed of rotation of the driven shaft. Because of the rotation of shart **14**, pinions **12** and **13** and centrifugal governor **15** cause piston **16** to be moved to the right, so that pressure oil from tube **21** may enter through cross channel **17** and longitudinal channel **18** into the space to the right of piston **16**. But this increase in oil pressure causes piston **16** to be moved back again

to its middle position. Consequently, a certain increased oil pressure is maintained in channel 17 and transmitted to space 33 of cylinder 27. This increased pressure causes piston 28 to move downward so that knob 32 also moves downward allowing for further movement of lever 3 which means an increase in fuel admission and in motor output. This again may cause another increase in car speed and thus a further increase in oil pressure in space 33, so that at last full opening of the carburetor is allowed.

But up to the pre-determined speed limit, for instance 3 miles per hour, the turning moment is practically held constant, whereas it is allowed to decrease in the normal manner, in accordance with the diagram of the relation between the secondary turning moment and the numbers of revolutions, which is well known.

Instead of making use of a fluid pressure device one may as well choose a mechanical, pneumatical or electrical device for preventing the carburetor to be opened to a certain extent only when starting. As the construction of such other devices appears to be within the knowledge of those skilled in the art after they have read my foregoing specification it is not deemed necessary to give special illustrations thereof.

I do not want to be limited to the details described or shown in the drawing as many variations may occur to those skilled in the art without deviating from the scope of my invention.

KARL MAYBACH.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

K. MAYBACH

TRANSMISSIONS FOR MOTOR VEHICLES

Filed Dec. 4, 1940

Serial No. 368,540

Fig. 1

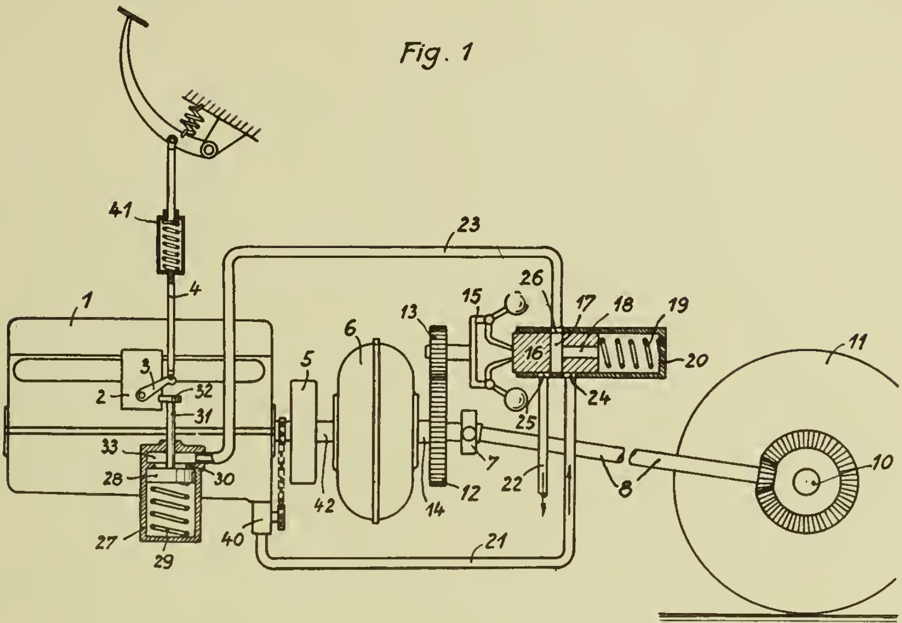
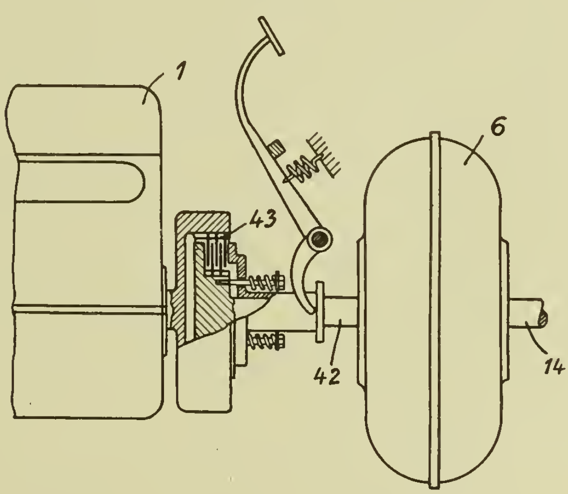


Fig. 2



Inventor: KARL MAYBACH

By Edmund F. Wang Jr.

Attorney

Published May 11, 1943

Serial No. 368,592

ALIEN PROPERTY CUSTODIAN

LOCK-NUTS

Walter Engelmann, Seestadt Rostock, Germany; vested in the Alien Property Custodian

Application filed December 5, 1940

This invention relates to lock-nuts, and more particularly to nuts of this kind which according to given conditions will either lock the nut on the screw-bolt appertaining thereto or, as the case may be, the screw-bolt on the nut against unintentional rotation. Lock-nuts as such are known in various forms of construction. The lock-nut forming part of my present invention is distinguished by especial reliability and efficacy and, in addition to this, by the feature that it may advantageously be used in either aforementioned condition. Furthermore, lock-nuts constructed in accordance with my invention are of extreme simplicity permitting manufacture in great quantities.

According to my invention there is used as locking element proper a disk which is mounted in or on the nut in a manner preventing rotation and axial displacement by means of tongues which in assembled condition of the nut and screw-bolt will resiliently engage with the threads of the latter. Accordingly, the said disk is firmly united with said nut. The locking effect in particular will be brought about by a certain twist imparted to said tongues due to the inclination or pitch of the thread, causing said tongues to exert a braking action on the flanks of the thread, said braking action being sufficient to effect the locking of the nut on the screw-bolt or the locking of the latter on the former.

Owing to the fact that said disk is mounted in the nut in the aforementioned manner, said disk will be prevented against falling out of the nut. Accordingly, the latter may be handled in the usual manner without using any auxiliaries, such as tools, and without loosing any parts.

The aforementioned braking action may further be increased by properly dimensioning said tongues in such a manner, that they will adjust themselves obliquely with respect to the longitudinal axis of the screw-bolt, when uniting the nut with the bolt, thus bracing the latter against the former.

The resilient tongues forming part of the nut constructed according to my present invention are preferably formed integrally with said disk and may be used in any desired number depending upon the individual conditions, such as for instance upon the diameter to be given to the screw-bolt.

My present invention may also be applied to nuts that are riveted to some support, a locking of the screw-bolt on the nut being effected in such case. The disk used in accordance with my invention may either be mounted in a nut of the last-mentioned kind in like manner as in an ordinary nut, or also be of U-shaped conformation to cover the upper face of the riveted nut and fastened in any desired manner to the flanges on the latter.

In the accompanying drawing which forms part of this specification I have represented four examples of locknuts constructed in accordance with my invention, Fig. 1 being a section through one form of construction of the new lock-nut, Fig. 2 a top-view on Fig. 1, Fig. 3 a top-view, similar to Fig. 2, of a second form of construction of a lock-nut, Fig. 4 a section through a lock-nut of the kind of a riveted nut, Fig. 5 a top-view on Fig. 4, Fig. 6 a section through a second form of construction of a riveted nut, and Fig. 7 a top-view on Fig. 6.

Referring more particularly to the drawing, the construction according to Figs. 1 and 2 serves to lock a nut *a* resting on a support *b* against rotation with respect to the screw-bolt *c*. For this purpose, according to this invention a disk *d* is mounted within the upper part of the nut *a*, said disk being provided with a plurality of tongues *f* arranged in star-shaped manner and projecting towards the thread *e* of the screw-bolt *c*. The tongues *f* are cut out of the material of the disk *d* by forming proper incisions on the disk between said tongues.

The disk *d* is secured against displacement in direction of the longitudinal axis of the screw-bolt *c* by mounting it fixedly in the rim *h* of a cup-shaped recess *i* provided in the nut *a*. This may for instance be done by inwardly beading the rim *h* of the nut. The disk *d* is furthermore secured against rotation within the nut by means of the projections *j* entering into interstices in the rim *h* of the nut *a*. The disk *d* will thus positively participate in the rotation of the nut *a* and form a unitary construction with the latter. In order to facilitate the inward beading of the rim *h*, the nut *a* may be of reduced outer diameter at said rim, as indicated in dotted lines in Fig. 1. In this manner the rim *h* will be of the conformation of a collar.

When screwing the nut *a* onto the thread *e* of the screw-bolt *c*, the tongues *f* will engage said thread and thereby be deformed or twisted to some extent, with the result that said tongues exert a braking action onto the thread *e* of the screw-bolt *c* causing the nut to be locked against rotation on said thread. On the other hand, it is well possible to disengage the nut *a* from the screw-bolt *c* with the aid of the usual tools.

The said braking action may eventually fur-

ther be assisted by a bracing action which may be attained by properly dimensioning said tongues f to augment their obliquity.

The number of tongues f to be used on the disk d depends upon the conditions at a time prevailing. Eventually it may be sufficient to provide only two tongues, f, if the latter are given a greater engaging surface with respect to the thread of the screw-bolt c.

The present invention may be applied with especial advantage to riveted nuts resulting in great simplicity of construction, as may, for instances, be seen from Figs. 4 to 7.

According to Figs. 4 and 5 there is again used a disk d which is fixedly mounted within the body k of a riveted nut provided in the usual manner with flanges l. Said disk may, for instance, be provided with four tongues f, as shown in Fig. 5. On screwing the bolt home, there will be a locking effect between nut and bolt, this locking effect preventing unintended unscrewing of the latter from the former.

According to Figs. 6 and 7 the disk is mounted exteriorly of the body of the nut instead of interiorly, as is the case in the constructions represented in the former figures. According to Figs. 6 and 7 more particularly, said disk is of U-shaped conformation and consists of a cup-shaped member m with adjoining flanges n serving to engage said member m with the flanges l of the riveted nut. This engaging action may be brought about as early as during riveting the nut to its support. However, in order to preserve a unitary construction of the nut, said cup-shaped member m may also be preliminarily united with the body of the nut by using paste or the like.

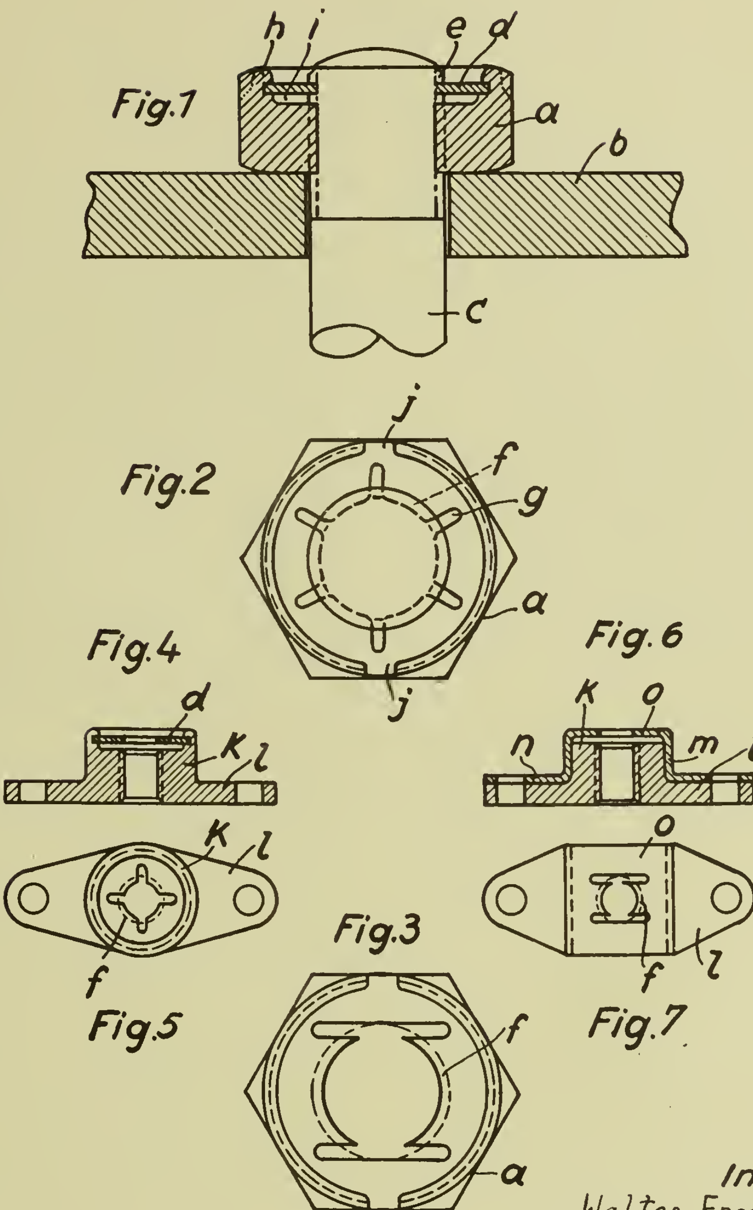
In order to provide in this case a still further locking action preventing rotation of said cup-shaped member m with respect to the body k of the nut and in order to increase the rigidity between said member and the nut, the body k of the nut is preferably given non-circular form, for instance by providing corners thereon, while said member m is of similar conformation. Locking of the screw-bolt within the nut is effected in this case by the upper part o of the cup-shaped member m which for this purpose is provided with tongues f as shown in Fig. 7.

WALTER ENGELMANN.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. ENGELMANN
LOCK-NUTS
Filed Dec. 5, 1940

Serial No.
368,592



Inventor:
Walter Engelmann

By
Richards & Geier
Attorney

Published May 11, 1943 Serial No. 368,646

ALIEN PROPERTY CUSTODIAN

ASSEMBLY ARRANGEMENTS FOR POWER TRANSMISSION IN AIRCRAFT

Paul Röhr and Siefried Gottschalk, Dessau, Germany; vested in the Alien Property Custodian

Application filed December 5, 1940

This invention relates to improvements in assembly arrangements for power transmission in aircraft, and refers to such arrangement for the transmission of electrical, mechanical, hydraulic and pneumatic power.

It is an object of the invention to provide such an assembly arrangement whereby the slow and tedious work of assembling the various power transmission lines (such as wiring, rods and piping), individually within the cramped space found in wings and other parts of an airplane may be eliminated, thereby both simplifying and speeding up the work.

Another object of the invention is to provide such an assembly arrangement wherein the total assembly consists of a plurality of sections each complete in themselves prior to being mounted in position, so that detachable connections provided on the extremities of the several parts on each section only need to be secured to corresponding connections provided on the adjacent extremities of the several parts on the adjoining section, thus permitting rapid installation or removal of any one of the sections.

A further object of the invention is to provide such an assembly arrangement wherein a rigid heating pipe forms the backbone of each section and heat therefrom warms the hydraulic and pneumatic piping and insures a free flow of the power medium in the latter.

Yet another object of the invention is to provide such an assembly arrangement including a rigid heating pipe in each section having transverse panels mounted thereon which support all the various power transmission lines in that section and hold them in correct spaced relation.

Still another object of the invention is to provide such an assembly arrangement with means for supporting the panels from a wall provided in the airplane part in which the installation is made so that the panels may be adjusted both vertically and horizontally relative to the wall to facilitate the aligning of the sections with one another.

Having thus stated some of the objects and advantages of the invention I will now proceed to describe it in detail with the aid of the accompanying drawings, in which:

Figure 1 illustrates a longitudinal sectional view of a portion of an airplane wing wherein the invention is installed.

Figure 2 is a section on the line A—B of Figure 1.

Figure 3 is a perspective view showing a portion of the assembly arrangement with the wiring duct partly broken away.

Referring to the drawings, within an airplane wing **14** a hollow space **12** is defined between parallel transverse walls **17** and **18**, a longitudinal wall **37**, and the nose **19** of the wing which may be removable to facilitate access to the assembly mounted therein.

Each section of the assembly includes a centrally disposed rigid longitudinal member preferably a heating pipe **16** having threaded extremities **27**. When all the sections of this heating pipe **16** are connected they may extend, for example, from an engine (not shown) upon the wing **14** to a heater (not shown) in a cabin (not shown). Supported around each length of pipe **16** are a plurality of transverse panels **21** having suitable openings **4** formed therein to receive and support piping **1** constituting sections of the hydraulic or pneumatic lines or both. **6** denotes clamping bars extending across the tops and bottoms of the panels **21** to retain the several portions of the piping **1** in correct spaced relation; these bars are held in position as by bolts **23**. Pivotally supported on the latter are levers **24** to which adjacent ends of rods **15** are secured, through the movement of which latter power is mechanically transmitted. Mounted on the upper clamping bars **6** are rests **22** which support a wiring duct **7** extending between them and having electric wires **2** therein. Projecting laterally from the panels **21** and supported for rotation thereon are nuts **36'**.

Mounted at spaced intervals on the wall **37** are bolsters **34** inwardly from which studs or other suitable fastening means **39'** project. Resting against the opposite face of the bolsters **34** are brackets **33** having vertically slotted holes **39** therethrough through which the fastening means **39'** extend so that the said brackets may be vertically adjusted prior to the tightening of nuts **39a** on the said fastening means. It will also be noted that in order to facilitate the vertical adjustment of the brackets **33** the contacting faces **33'** of the latter and **34'** of the bolsters **34** are horizontally serrated. Projecting horizontally from the brackets **34** are threaded connections **36** to receive the nuts **36'**. Thus by rotating the latter the distance between the wall **37** and the axis of the heating pipe **16** in each section may be varied so that each section of the assembly may be quickly and easily brought into alignment with the other sections.

When the individual sections are in position the adjacent ends of the heating pipe sections **16** are

detachably connected as by nuts 28 which engage the threaded extremities of two adjacent pipe ends; the adjacent ends of lengths of piping 1 are detachably connected as by union nuts 32; the adjacent ends of the ducts 7 are connected by junction boxes 31 wherein the wiring extending through the separate ducts is suitably connected; and suitable detachable connections 40 are employed connecting adjacent ends of aligned pairs of rods 15 in adjacent sections.

It will thus be noted that each section of the assembly is completely pre-fabricated, and after installation it is merely necessary to connect the lengths of heating pipes 16, the hydraulic and pneumatic piping 1, the ducts 7 and the wires 2 therein, and the rods 15 through movement of which mechanical power is transmitted, to the corresponding parts of adjacent sections. If repairs are needed a defective section may be quickly removed and another easily substituted. The size and rigidity of the lengths of heating pipe 16 render each section amply strong to withstand distortion in ordinary handling, and the provision of heat in the pipe 16 prevents the power media in the hydraulic and pneumatic piping 1 from freezing, thus insuring satisfactory flow to the mechanisms operated thereby.

PAUL RÖHR.
SIEGFRIED GOTTSCHALK.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

P. RÖHR ET AL

ASSEMBLY ARRANGEMENTS FOR POWER TRANSMISSION IN AIRCRAFT

Filed Dec. 5, 1940

Serial No. 368,646

2 Sheets-Sheet 1

Fig. 1

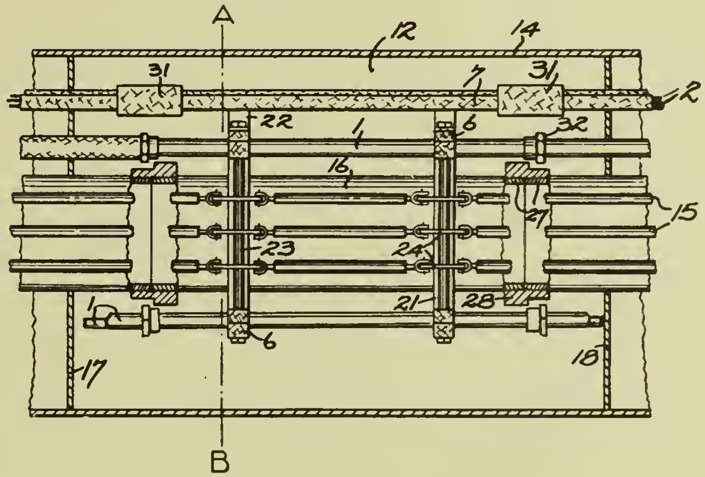
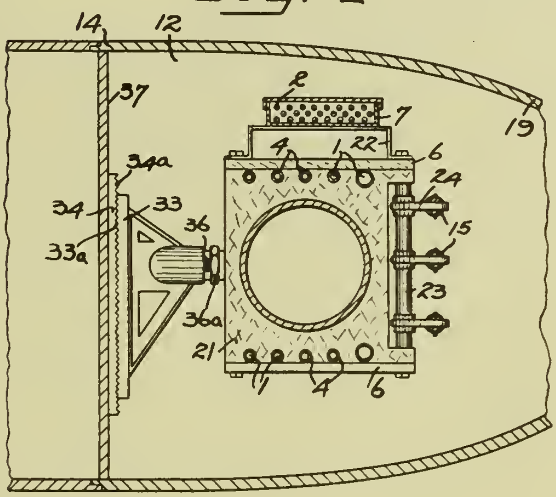


Fig. 2



Inventors:
Paul Röhr
Siegfried Gottschalk
by Geral J. Baldwin
their Attorney.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

P. RÖHR ET AL

ASSEMBLY ARRANGEMENTS FOR POWER TRANSMISSION IN AIRCRAFT

Filed Dec. 5, 1940

Serial No. 368,646

2 Sheets-Sheet 2

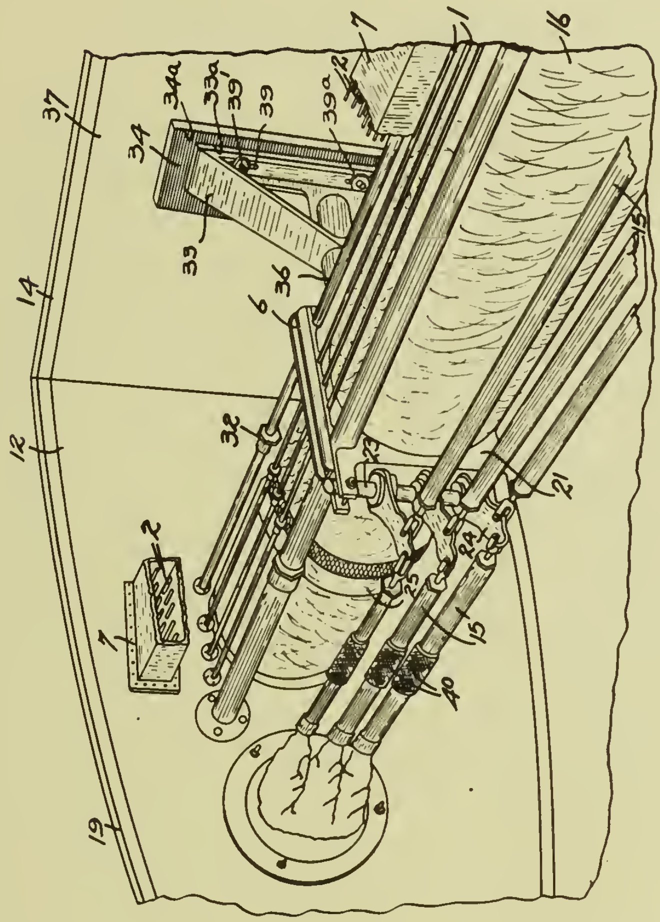


Fig. 3.

Inventors:
Paul Röhr
Siegfried Gottschalk
by
their Attorney

Published May 11, 1943

Serial No. 369,346

ALIEN PROPERTY CUSTODIAN

METHOD OF MAKING RESILIENT SEATS, ARMS, BACKS OR THE LIKE FOR FURNITURE, AND SEATS, ETC., MADE ACCORDING TO THE SAID METHOD

Anthonie Story, Amsterdam, Netherlands; vested in the Alien Property Custodian

Application filed December 9, 1940

This invention relates to a method of making spring seats and the like of the kind in which the resiliency of the seat is obtained by means of spiral springs provided in the said seat and also to furniture seats made according to the said method.

For upholstering a seat body a great many operations have been hitherto needed all of which operations are to be carried out by hand. These operations are the following ones: In the first place a number of bands of material perpendicular to each other are attached to the seat body; these are the so-called supporting straps. The spiral springs are then sewed fast to the said straps, after which the spiral springs are connected by means of rope in order to fix the same with regard to each other. For a further fixation of the outer springs a steel or bamboo frame is attached to the outer springs along the outer side of the said outer springs. After this a layer of canvas is stretched over the fixed springs, which layer is nailed to the body of the seat. On this canvas there is provided a stuffing consisting of "crin végétal" mixed with horsehair or other materials according to the quality of the seat to be made. A layer of stuffing cloth is stretched over this stuffing and held in place by cross-lines of stitching, after which some additional stuffing material is provided at the edges, in order to prevent the seat from growing too convex. After the outer edges have been closed by sewing, the edges where the additional stuffing material was introduced are often stitched through several times. On the surface which has grown a little concave on account of the additional stuffing at the edges, there is still applied a top stuffing in order to render the surface of the seat level. The upholstering material such as e. g. moquette or wool velvet is then stretched over the said final stuffing, which like the preceding coverings is nailed to the side edges of the seat frame.

The present invention has for its purpose to simplify these laborious operations and to provide a method for making a furniture seat or back in which the number of operations is greatly reduced, while providing besides a great saving of time, also a great saving of material.

According to the invention use is made of a flexible metal plate to which the springs of the seat are attached with one end. This has the great advantage that the operation of fixing the springs with regard to each other will no longer be needed, while moreover the flexible surface will keep the springs completely in their places, whereby a double layer of stuffing and the use of two layers of material provided between the springs and the cover will be superfluous. In this manner the number of operations is greatly reduced. According to the invention the operations now will be the following ones: The straps are attached to the body of the seat, while the springs are secured to the loose metal plate. The metal plate with the springs is laid over the supporting straps and the springs are attached with their ends to the said straps. The metal plate is now screwed to the back of the seat body. After this a complete layer of stuffing is deposited on the metal plate. This layer of stuffing may consist e. g. of "crin végétal," horsehair, cotton, felt or the like. Finally the covering material is stretched over the stuffing layer and nailed to the seat body. The operation also with regard to the material required, is simplified in such a way that a saving of several decades of percents is obtained in the manufacture of furniture seats. A furniture seat according to the method of the invention consequently comprises a seat body the bottom of which is provided with supporting straps, spiral- or other springs attached to the said straps at one end and to a metal plate at the other end, the said metal plate being screwed to the seat body at the back of the piece of furniture, a layer of stuffing deposited on the metal plate and the covering material which is stretched over the stuffing and attached to the body of the seat.

Furniture seats according to the invention are suitable for chairs as well as for benches, sofas and the like.

In order to render the metal plate not only flexible as a whole but also in portions, the plate according to the invention may be slotted, the slots running in longitudinal direction of the seat.

A very simple manner of attaching the springs to the metal plate is obtained according to the invention by punching small tongues in the metal plate, which tongues are turned over the outer winding of the springs. In this manner the springs will be rigidly attached to the metal plate.

In order to prevent any troublesome squeaking or creaking of the seat, according to the invention strips of a suitable sound damping material may be applied between the springs and the metal plate.

It is often desirable to render the front edge of the seat higher than the rear edge, in order to prevent a downward inclination of the seat when some one sits down on the front edge or the front

portion of the seat. This might be done by stretching the covering material less taut at the front side, which would release the tension of the front springs, whereby the front edge would be urged upwardly. According to the invention, however, it will be advantageous to use springs that are longer at the front edge of the seat than those at the back and to keep the covering material tauter.

Sometimes it is advisable to render the surface of the seat convex. This may be accomplished by using a curved metal plate instead of a flat one. Since, however, metal plates that are curved in the right manner are considerably more expensive than flat plates, it is to be preferred according to the invention to have the springs at the front of the seat longer than those at the back and then to provide springs in the center of the seat that are longer than those at the front.

In this manner the surface after the covering has been stretched over the same, will become more or less convex, while at the same time the front edge will be higher than the rear edge.

The method according to the invention is illustrated in the drawing in which the different stages of the production process are represented and in which

Fig. 1 is a plan view of the bottom of a seat body with the straps attached thereto.

Fig. 2 is a plan view of a metal plate provided with slots and with the springs secured on the same, while strips of linen are provided as a sound damping material.

Fig. 3 is a section of a seat body and the metal plate with springs arranged on the same.

Fig. 4 is a section through a finished seat.

In Fig. 1 the seat body is denoted by *a*, on which the straps *b* are secured by means of nails *c*.

In Fig. 2 *d* represents a metal plate with a recess *e* and slots *f*. Springs *g* are secured on the same by folding tongues *h* over the outer winding of the said springs. This manner of securing the springs which is only indicated for one spring is the same for all of them. Sound damping strips *i* are provided between the springs and the metal plate. The plate in the next working step is screwed in the seat body by means of screws *k* which are passed through screw holes *f*. During this same operation the spiral springs *g* are sewed fast to the straps *b* (Fig. 3). Fig. 4 represents the finished seat. On the metal plate *d* there is provided a solid layer of stuffing material *l* consisting e. g. of "crin végétal", horsehair, cotton or felt. Over this stuffing there is provided the final covering layer which does not get into touch with the metal as the stuffing is larger than the said metal plate, so that it is pressed over the edges of the plate.

It goes without saying that the straps and the feature of sewing the springs to the same are not essential; other ways and means might also be used for attaching the springs to the bottom of the seat body.

ANTHONIE STORY.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. STORY
METHOD OF MAKING RESILIENT SEATS, ARMS, BACKS OR THE LIKE FOR FURNITURE, AND SEATS, ETC. MADE ACCORDING TO THE SAID METHOD
Filed Dec. 9, 1940

Serial No.
369,346

Fig.1.

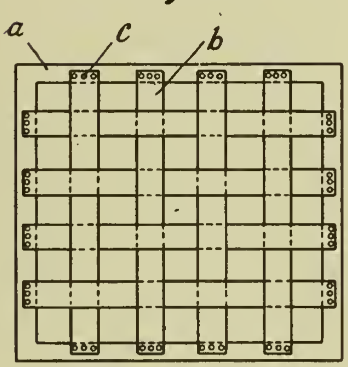


Fig.2.

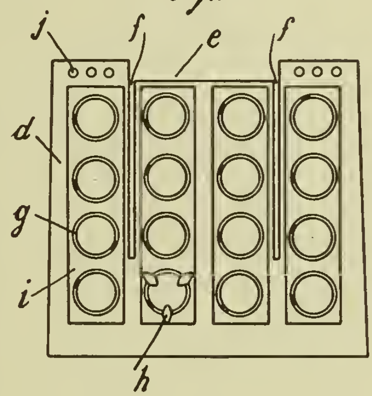


Fig.4.

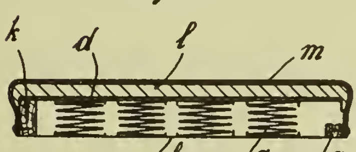
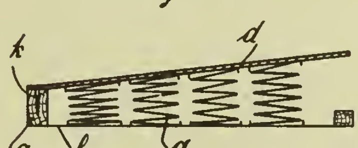


Fig.3.



Inventor
A. Story
By
E. F. Wenderoth
Atty.

Published May 11, 1943 | Serial No. 369,351

ALIEN PROPERTY CUSTODIAN

FROST RESISTANT MICRO-POROUS PRODUCT

Gommaris Franciscus Hannot, Rotterdam, Netherlands; vested in the Alien Property Custodian

No Drawing. Application filed December 9, 1940

Road surfaces, road coatings, stones and materials for filling the joints between pavement stones should especially satisfy the requirements that they have a good resistance against pressure, that their surface is anti-slip and remains so in the rain and that they should not crack or deteriorate in winter during periods of frost.

It has been proposed to use artificial materials consisting of set mixtures of cement and a mineral aggregate, such as sand, slag or ashes and water. Especially the addition of a suitable amount of fuelslag can lead to good anti-slip properties of the material. Such material is microporous and can absorb a lot of water. Here, however, lies the cause of difficulties in winter. The porous material, which has absorbed water cracks and breaks down into pieces during periods of frost.

The object of my invention is to provide an artificial material or product which, while being micro-porous also has a good resistance against frost.

One of the main features of my invention is the use of a quantity of an organic gelatinizing substance, i. e. a substance adapted to form a gel, such as gelatine, pectine or agar is added to the mixture from which the material is manufactured.

Comparing freezing tests have shown that the product according to the invention is superior to other materials as far as frost resistance is concerned.

This may be explained by the fact that organic gels such as gelatine, agar and pectine have a freezing point, which is considerably lower than that of water. They can absorb and colloidally bind a lot of water and during freezing their volume decreases instead of the well known increase of volume of ordinary water which causes the cracking of materials during frost.

Moreover such gels are very elastic and can be easily deformed.

In an embodiment according to my invention I use a decoction of orange skins.

Orange skins contain a good quantity of pectine.

Two practical examples of carrying out my invention will now be described.

Example I

Two litres of coarse sand (grain size 2–0.4 mm), one litre of very fine sand, one litre of slag (grain size 0–2 mm), 1200 grams of cement i. e. 0.8 litre of cement having a specific weight of 1.5, are mixed with about 1.5 litre of water. The amount of water varies according to the temperature in the atmosphere; if it is warm some more water is necessary. To this mixture 40–50 grams of a special liquid is added. This liquid is obtained by first boiling a shredded orange in one litre of water for so long a time that the skin parts sink, and then filter the obtained decoction after a fortnight's period of rest. It appears that the best results are obtained when only the skin of the orange is boiled.

Artificial stones made from this mixture, after well setting of the mixture were subjected to a heavy freezing test as follows:

	Hours
Submersion in water of 17–20° C	8
Freezing at minus 8 to minus 10° C	16
Thawing in air of 16° C	8
Drying at 65° C	15
Cooling	1

The operations were repeated twenty times. The same test was made with stones formed from the mixture as described but from which the decoction was omitted. The latter stones cracked and broke down into pieces, those according to my invention remained fully intact and their weight did not alter.

Example II

Gelatine is boiled with water in the ratio of 25 grams of gelatine to two litres of water. The obtained product is filtered. 2.5 to 3.5 volume parts of this product are added to 150 volume parts of water. The resulting amount of liquid is mixed with 200 volume parts of sand having a grain size of 2 to 0.4 millimeter, 100 volume parts of fine sand having a grain size of 0.04 millimetres and 80 volume parts of cement.

The mix is shaped to the required form e. g. cast and vibrated in moulds. After a curing (setting) period of about 28 days the product according to the invention is finished.

Having now particularly described and ascertained the nature of my said invention and in what manner it is to be performed.

GOMMARIS FRANCISCUS HANNOT.

Published May 11, 1943

Serial No. 369,614

ALIEN PROPERTY CUSTODIAN

PRODUCTION OF CORROSION-PROOF SURFACES ON STEEL BY CHROMIUM DIFFUSION

Gottfried Becker, Buderich, near Neuss, and Karl Daeves and Fritz Steinberg, Dusseldorf, Germany; vested in the Alien Property Custodian

No Drawing. Application filed December 11, 1940

It has already been proposed, to render corrosion-proof articles of steel by diffusing-in of chromium. Older methods work so that the articles are packed in pulverized chromium or ferrochromium and heated to high temperatures. Recently working methods have been proposed and developed, which use volatile chromium compounds and which amongst others possess the advantage of lower operation temperatures. Some of these methods, which work with chromium-chloride have proved to be especially advantageous and are capable of being carried through economically in large size service. The diffusion zones obtained according to these methods at low carburized steel have, after a treatment of 4 to 5 hours and a treatment temperature of about 1000° C., an average depth of 0.1 mm.

Surprisingly it has been found that under the same working conditions approximately double the penetration depth of the chromium is obtained, if the articles are made from a steel with 0.02 to 0.4% carbon, which has an overnormal silicon content. These layers are, however, somewhat brittle. A further unexpected improvement of the physical and chemical properties of the diffusion layer is obtained, if the steel from which the articles are made has, besides the overnormal silicon content, an addition of titanium which binds the carbon of the base material. Instead of titanium other carbide formers, such as niobium, tantalum, vanadium or the like may be used.

Example

If an article is made of a steel of the composition

C	Mn	Si	Ti
Per cent 0.05	*Per cent* 0.31	*Per cent* 3.5	*Per cent* 0.25

and then exposed at about 1000° C. for about 5 hours to the action of chromium chloride, a diffusion zone of a depth of approximately 0.2 mm is obtained. Besides the greater diffusion depth compared with the steel having normal silicon content the layer is distinguished, owing to the titanium content in the base material, by good physical and chemical properties.

When the base material according to the invention is used, a similar acceleration of the diffusion effect is obtained also in the older diffusion operations working with metal powders.

GOTTFRIED BECKER.
KARL DAEVES.
FRITZ STEINBERG.

Published May 11, 1943

Serial No. 369,630

ALIEN PROPERTY CUSTODIAN

ANTI-OSCILLATION SUSPENSION FOR BEDS AND THE LIKE

László Sebestyén, Budapest, Hungary; vested in the Alien Property Custodian

Application filed December 11, 1940

Many people are more or less sensitive towards the oscillating movements of sea ships and are therefore liable to become sea-sick.

The purpose of the invention is to provide an Anti-Oscillation Suspension for Beds and the Like, which, employed on ships exposed to oscillating movement, will notwithstanding the oscillations of the ship, always remain in relative rest and will thus as a rule cause persons sensitive towards sea-sickness and spending considerable length of time on such beds etc. to be protected against sea-sickness or enable such persons as have already become sea-sick to find, whilst still on the ship, the rest necessary for recovery.

According to the invention this object is achieved by suspending the bed, chair, or similar piece of furniture intended to assure rest to its user on a single spatial (universal) joint. One member of this joint is in solid connection with the ship and follows the motion of the latter, whilst its other member is fixed to the bed or the like, and remains immovable, in consequence of the weight of the loaded or non-loaded bed etc., independently of the oscillation of the ship. In order to ensure that the bed etc. displaced accidentally or inadvertently independently of the oscillation of the ship should shortly again come to rest, a suitable oscillation damper, effecting the damping of oscillations e. g. by means of friction, is inserted between the two members of the spatial joint, the damping effect of the said oscillation damper being preferably adjustable.

On the accompanying drawings four variants of the piece of furniture, for example a bed, according to the invention, in which the spatial joint is represented by a spherical joint, are represented diagrammatically.

Fig. 1 is a side elevation of the bed and of its suspension.

Fig. 2 is a suitable end view. Here no oscillation damper is employed.

Fig. 3 is the section of a part of the spherical joint with oscillation-damping spring drawn to greater scale.

Fig. 4 is a section similar to Fig. 3, with oscillation-damping spring of adjustable strength.

Fig. 5 is a side elevation simliar, to Fig. 1 of a further variant of a kind of bed etc. comprising two fixing bars capable of being supported on the floor.

Fig. 6 is an end view belonging to Fig. 5.

Two cylindrical iron bars *b* are fixed solidly to each longitudinal side of the bed *a* (Figs. 1 and 2), the upper ends of the said bars being fixed by means of the rivets *c* to four extensions *e* welded to the joint ring *d*. All the fixing devices of the suspension riggings are, accordingly, rigid. The ring *d* is in close contact with the hollow joint sphere *f* and is capable of gliding on the latter in any direction. The sphere *f* is composed of two hemispheres closely fitted to each other and held together by means of the screw *g*, and can be fixed by means of the three-arm bracket *h*, for instance to the roof *i* of a room (cabin) or to some other suitable place of the ship. The members *f*—*h* are following the oscillating motion of the ship, whereas the members *a*—*e* are, owing to their own weight and owing to their possible load, remaining at rest, whilst the sphere *f* is capable of being displaced by gliding in the ring *d*. The reclining surface "*a*" of the bed has a vertical cross-section which is concave all over its length, in consequence whereof it compels the person lying in it to keep to the middle part of the bed and thus to refrain from altering the position as shown of the centre of gravity of the bed. Similarly, the seat surface of round chairs etc. may also be preferably made concave, notably in all vertical sections.

Fig. 3 represents a further variant in which the mutual displacement of the ring *d* and of the sphere *f* are braked by the plate spring *j* fixed to the ring, the free end of the said spring becoming pressed against the sphere.

In the variant according to Fig. 4, the pressure of the spring against the sphere may be adjusted by means of a screw *l* capable of being rotated in the rigid arm *k* fixed to the ring.

The employment of such a damping device is—as mentioned above—advisable in order to ensure the rapid elimination of any oscillations caused by such forces as to which the bed may be subjected accidentally or by inadvertence. The amount of damping is of course chosen of such magnitude only as to prevent its affecting in any detrimental extent the displacement, produced by means of the oscillations of the ship, of the sphere *f* in the ring *d*. The force effects due to inadvertence or to accidental causes referred to above, may arise, for instance, if somebody enters the bed *a* or descends from it, or if a shock is imparted to the bed or if there is a draught, or if the travel speed of the ship varies suddenly.

In order to prevent the detrimental oscillations referred to, it is also possible to employ, instead of the damping device employed in connection with the sphere *f*, or in addition thereto, two lower supporting bars *m* according to Figs. 5–6, each of which is movable upwards and downwards in a guide *n* fixed to the bed *a*, and can

be fixed in the desired position by means of the screw *o*. When the bed is being used, the bars *m* are in the position illustrated and their lower ends are not in contact with the floor. When the person who has been occupying the bed leaves it, or at least when he again wishes to enter the bed, the bars *n*, after loosening the screws o let down in such an extent as to ensure that their lower ends on which a rubber shoe *p* is provided should reach down to the floor, following which the bars are again fixed by tightening the screws o. In this case the force effects accompanying the entrance of the person into the bed will not move the bed from its position of rest as this will be prevented by the shoes *p* rubbing on the floor. After the person has entered the bed, the screws o are loosened, the bars *m* are drawn-up from the floor into the position shown and are again fixed in this position.

The new auti-oscillation bed or the like may of course be modified in many ways without leaving the range of the invention. Thus, for instance, it may be possible to vary the length of the suspension bars, and the suspension bars may be mutually connected by reinforcing cross-beams. The bed may also be suspended on a bracket fixed to the wall, or—e. g. on deck—it may be suspended on three or four supporting legs meeting in a common point above the bed. The joint sphere *f* may also be relatively smaller than the one represented on the drawing and may also be solid and of one piece. The suspension bars *b* may also be fixed to some other parts of the bed *a*, e. g. to the four corners of its top surface. In the case of the variant according to Figs. 5–6 the method of motion and fixing as well as the number of the supporting bars *m* may also be different from those shown, thus for instance, these bars may be brought into their upper or lower position automatically by springs etc.

LÁSZLÓ SEBESTYÉN.

PUBLISHED

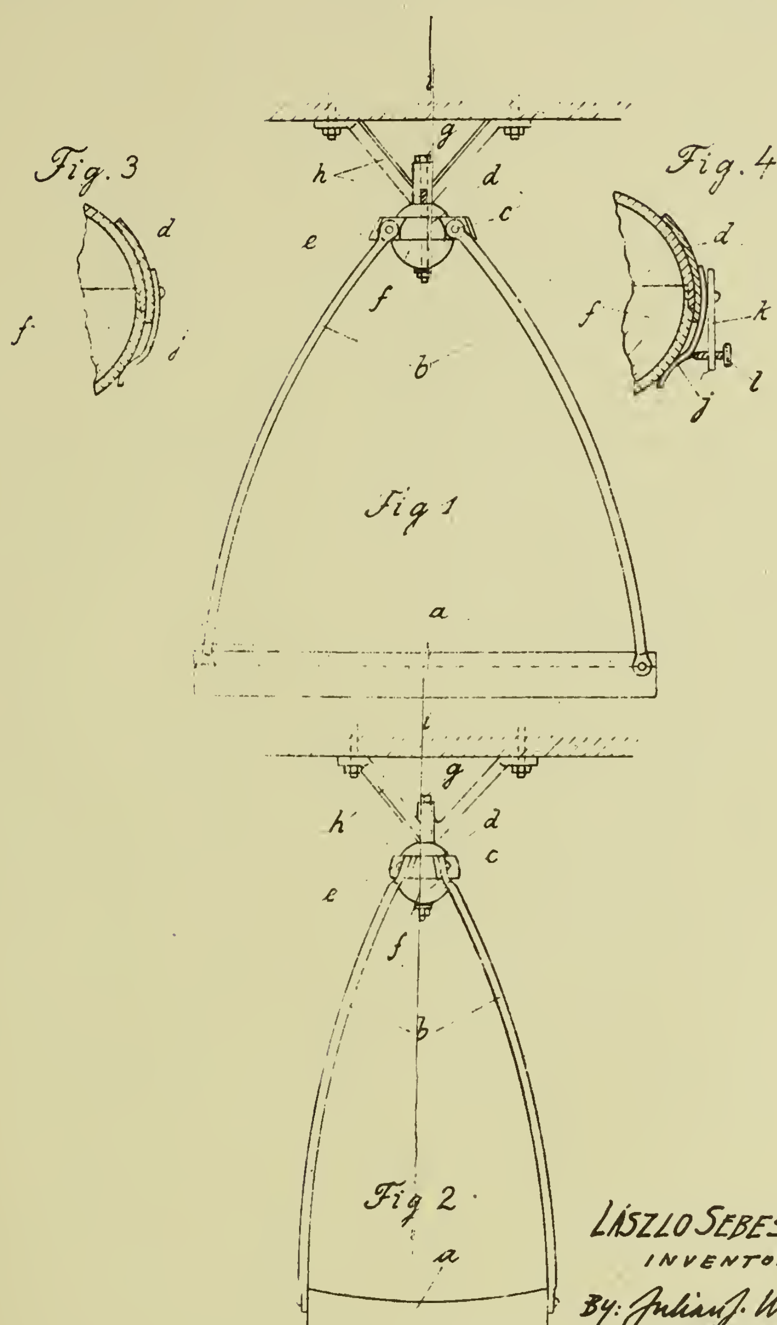
MAY 11, 1943.

BY A. P. C.

L. SEBESTYÉN
ANTI-OSCILLATION SUSPENSION
FOR BEDS AND THE LIKE
Filed Dec. 11, 1940

Serial No.
369,630

2 Sheets-Sheet 1



LÁSZLO SEBESTYÉN,
INVENTOR.
By: Julian J. Wittal,
his attorney.

r in-

PUBLISHED
MAY 11, 1943.
BY A. P. C.

L. SEBESTYÉN
ANTI-OSCILLATION SUSPENSION
FOR BEDS AND THE LIKE
Filed Dec. 11, 1940

Serial No.
369,630
2 Sheets-Sheet 2

Fig. 5

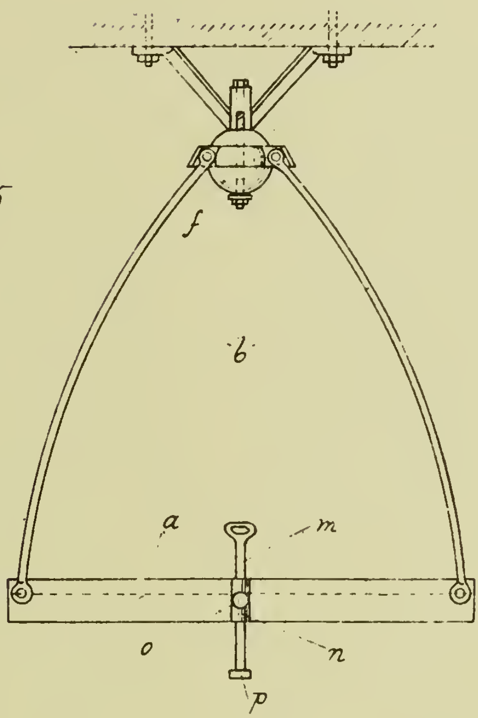
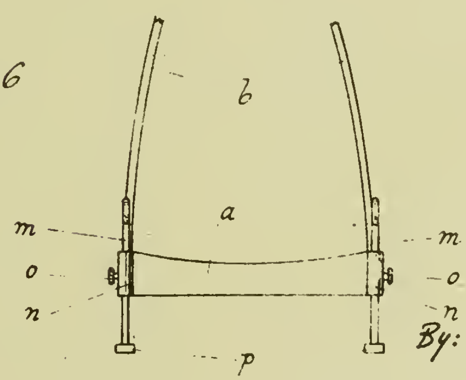


Fig. 6



LÁSZLO SEBESTYÉN,
INVENTOR.
By: Julian Wittal
his attorney.

Published May 11, 1943 Serial No. 369,982

ALIEN PROPERTY CUSTODIAN

APPARATUS FOR PROCESSING MATERIALS

Wilhelm Model, Stuttgart-Feuerbach, Germany; vested in the Alien Property Custodian

Application filed December 13, 1940

The present invention relates to Utility Machines for treating particulate materials, and is particularly concerned with a machine for washing, cleaning, or peeling fruits or vegetables, for examples potatoes.

Such machines are usually equipped with a movable agitator disposed within a treatment compartment. The goods are inserted into this compartment and are kept in motion or circulation until the treatment is completed. Difficulties are usually experienced in such machines in view of the lack of control apparatus or, where such apparatus is provided, in view of its complicated and unreliable working.

The present invention overcomes these difficulties by the provision of means for setting or predetermining the duration of treatment and automatically controlling the cessation of operation and the ejection or discharge of the treated goods, as well as automatically resetting the machine for another cycle of operation.

The invention is not limited to use with fruits or potato peeling or cleaning machines although it is described in connection with such machines, and it is, therefore, understood that the designation "particulate materials" or "goods to be treated" or equivalent language used in this specification and in the appended claims are intended, unless stated otherwise, to cover broadly goods that may be subjected to surface treatment such as cleaning, washing, peeling or separating of impurities.

The invention, briefly described, is incorporated in the example shown herein in a machine having an upper treatment chamber and driving as well as control apparatus disposed below the same. The goods are inserted into the treatment chamber and are kept in motion or circulation by an agitator which may be made in the shape of a suitable disk. The drive shaft projects through the bottom of the treatment chamber and carries a spur gear at its lower end engaging another spur gear on an auxiliary shaft which is equipped with a vertically disposed worm. The latter engages a worm gear mounted on two oppositely disposed levers which are journaled on a shaft in such a manner that the worm gear with its levers can swing out of engagement with the vertically disposed worm. The worm gear is made in the shape of a disk wheel and constitutes a control member of the apparatus. Presuming that this disengaged condition exists, nothing will happen responsive to the rotation of the drive shaft. However, the gear wheel or disk or control member noted above is arranged so that it engages the worm drive for operation as soon as the goods are placed in the machine. The rotation of the drive shaft will therefore also drive the control gear disk. This disk, in the example described herein, carries two angularly disposed cams, one on each side thereof, and can be angularly set in any desired position so as to determine the duration of effective operation of the machine.

During the operation the control worm disk or wheel rotates and the cams thereon are thus angularly advanced in a certain ratio to the speed of the agitator in the treatment chamber, this ratio being determined by the gearing between these parts. One cam cooperates with and actuates after the lapse of a certain time a lever system which unlocks and opens a discharge gate for ejecting the finished goods. The other cam subsequently actuates a lever system which releases the control gear wheel from engagement with the drive worm. The appaartus is now operatively ineffective. Upon closure of the discharge gate and insertion of a new batch of goods through a supply gate, the cam carrying control gear wheel is again automatically moved into engagement with the drive worm and the new operating cycle can begin.

The above intimated objects and other objects and features will be pointed out in the detailed description rendered below with reference to the drawings, wherein

Fig. 1 indicates an embodiment of the invention applied to a potato peeling and/or cleaning, machine, the machine being shown schematically in section;

Fig. 2 is another side view of the machine taken at a right angle to Fig. 1, the upper part being shown in plane view and the lower part in section to illustrate the control means more clearly;

Fig. 3 shows a section of the machine taken along the line A—B in Fig. 1; and

Fig. 4 illustrates a top view looking down at the machine in the direction of the arrow C in Fig. 1.

Referring now to the drawings, numeral 1 indicates a vertical drive shaft journaled in a bearing 2 and carrying the agitator disk 3 disposed in the treatment chamber. The drive is accomplished by means of the bevel gears 4 and 5 the latter being on a shaft which carries the pulley or drive member 6. A spur gear 7 is provided at the lower end of the drive shaft 1 and engages a spur gear 8. This latter spur gear actuates the control drive worm 9. The control member 10 is a worm gear disk or wheel for engagement with the worm 9. It carries two cams 11 and 11*a*, one on each side of the disk. It will be

noted that these cams are angularly displaced on the disk so that they will successively come into operation to release certain control devices.

The two cams 11 and 11a can be angularly set in any predetermined position by means of a pulley system comprising the rope 12, one end of which is anchored upon the shaft 14 and the other end of which is anchored at a screw mounted on a bracket and operated by means of a knurled nut 16. The gear wheel 10 is fixedly attached to the shaft 14. Therefore, an actuation of the nut 16 either slackening or shortening of the rope 12 will cause rotation of the shaft 14 and with it of the control disk 10 thus angularly displacing or putting the cams 11 or 11a in any desired angular position. This adjustment is made in accordance with the time that is required for completing the treatment of the goods in the treatment chamber.

The cam 11 is effective when the agitator disk 3 has made a sufficient number of revolutions, that is, at a time when the treatment of the goods is completed. The cam 11 at that time acts upon the free end 15a of a lever (Fig. 2) which is journaled at the point 16a thus displacing the lever arm 17 in clockwise direction and shifting the discharge gate release bar 18 upwardly. The upper end of this bar releases the latch or lock mechanism 30 to permit the gate 19 to swing open by the tension of the release spring 41. The finished goods are now discharged through the open gate.

The cam 11a, subsequent to the above described operation, actuates mechanism causing the disengagement of the control gear wheel 10 from the drive worm 9. This is best described with reference to Figs. 1, 2 and 3. The control gear wheel 10 is, as noted above, mounted on the shaft 14 which is held by two oppositely disposed levers 22. These lever arms are angularly shaped as noted in Fig. 1 at 24 and are journaled at 23. They are connected together by means of bars or ribs 25 and 26 (Fig. 2). The pulley system 28, 29 is anchored at the rib or bar 27. The rope 28 is slackened as shown in Fig. 1 so that the control disk or gear wheel 10 can swing from its position shown in the drawing at the time when the treatment of the goods is completed. The other end of the rope 28 is anchored at 32 on the supply gate lever 39.

The release of the control disk 10 and its carriers is accomplished through the medium of the lever system comprising the lever 34 which is journaled at 33 below the worm 9. This lever carries a weight 36 so as to hold it in the position shown in Fig. 1. At its free end the lever 34 is provided with a groove 40 adapted to engage the rib or bar 25 which connects the two lever arms 22. In the position shown in Fig. 1 the lever 34 is locked together with the bar 25, thus holding the levers 22 and therefore the control disk 10 in driving engagement with worm 9. As the rotation of the drive shaft advances, the cam 11a will advance in anticlockwise direction and will finally engage the release pin 37 provided on the lever 34 thus rotating the lever in clockwise direction and removing the groove 40 from engagement with the rod or rib 25. The control disk 10 with its two carrier levers 22 can now swing in anticlockwise direction around the fulcrum 23 out of driving engagement with the worm 9. The mechanism is now idling.

The discharge gate 19 is open, the finished goods having been ejected, and the control disk 10 is out of driving engagement with worm 9 and has rotated back in clockwise direction to the initial angular position in which it is shown in the drawings.

The automatic return of the control gear wheel 10 into its initial angular position is accomplished by means of the spring 42 (Figs. 2 and 3), one end of which is connected with the shaft 14 and the other end with one of the levers 22. The shaft 14 is fixedly connected with the control gear wheel 10, and the wheel therefore follows the rotation of the shaft. The effective operative operation of the control gear wheel 10 by means of the drive worm 9 tensions the spring 42 and, therefore, when the disk 10 is removed from engagement with worm 9 the tension of the spring 42 returns it into its initial angular position which was previously determined by the operation of the rope and pulley system 12.

When it is desired to operate the machine through another cycle of operation, the goods will be inserted in the treatment chamber through the top lid or supply gate 38. This gate is connected through the pulley system 28, 29 with the carrier levers 22 of the control gear wheel 10. The actuation of the gate lever 39 incident to inserting the goods into the treatment chamber tensions the rope 28, thereby swinging the lever 22 in clockwise direction and bringing about the driving engagement of the control gear wheel 10 with the drive worm 9.

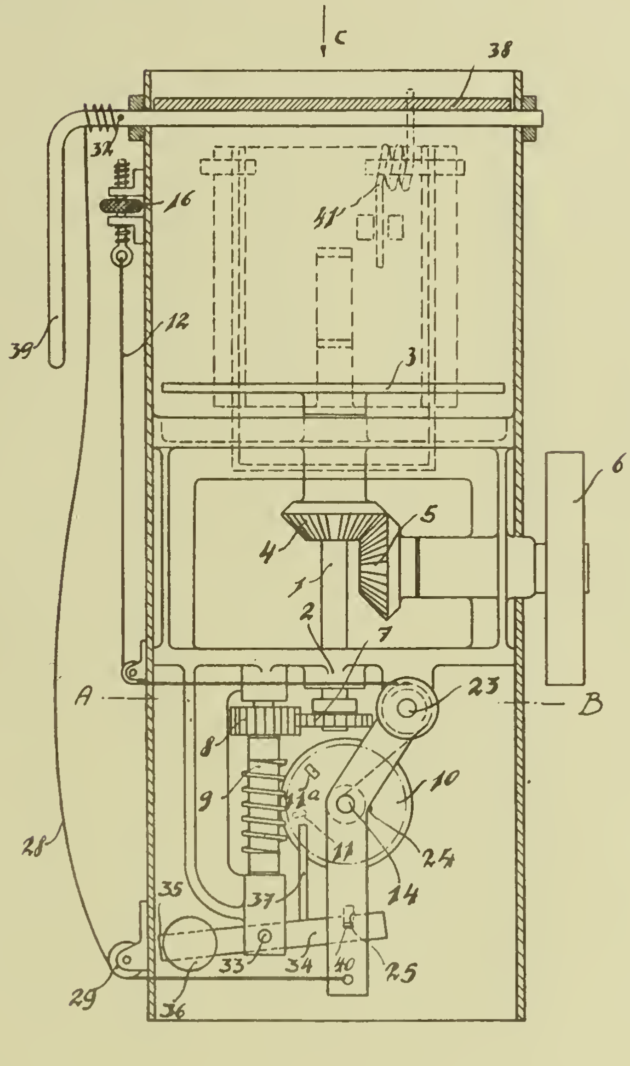
WILHELM MODEL.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. MODEL
APPARATUS FOR PROCESSING MATERIALS
Filed Dec. 13, 1940

Serial No.
369,982
3 Sheets-Sheet 1

Fig. 1



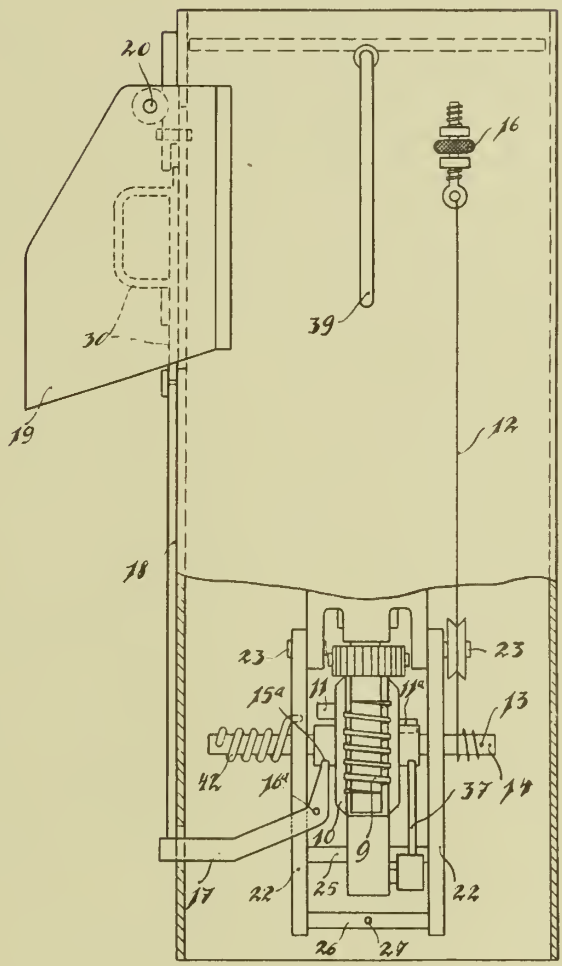
Inventor: Wilhelm Model,
Stuttgart-Feuerbach
Attorney: Richardson & Geier

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. MODEL
APPARATUS FOR PROCESSING MATERIALS
Filed Dec. 13, 1940

Serial No.
369,982
3 Sheets-Sheet 2

Fig. 2



Inventor: Wilhelm Model,
Stuttgart-Feuerbach

Attorney:

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. MODEL
APPARATUS FOR PROCESSING MATERIALS
Filed Dec. 13, 1940

Serial No.
369,982
3 Sheets-Sheet 3

Fig. 3

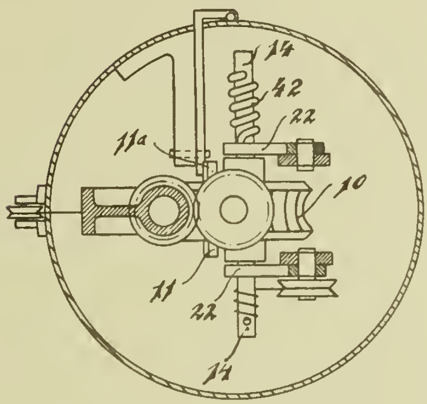
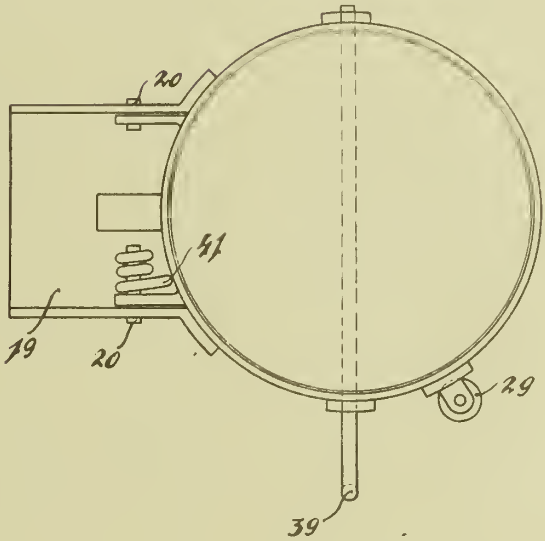


Fig. 4



Inventor: Wilhelm Model,
Stuttgart-Feuerbach
Attorney: Richardson & Geier

Published May 11, 1943 Serial No. 370,060

ALIEN PROPERTY CUSTODIAN

VENEERING PRESS

Adolf Friz, Stuttgart-Bad Cannstatt, Germany;
vested in the Alien Property Custodian

Application filed December 13, 1940

This invention relates to veneering machines or presses, and is particularly concerned with a new and improved arrangement and operation of yieldably mounted elements such as rollers exerting elastic downward pressure upon pieces of the veneer moving underneath the rollers on suitable conveyor means, for example, a conveyor belt or chain or the like.

The edges or margins of the pieces of veneer which are to be joined or mounted in such a press are provided with suitable binder means, for example, glue, and the rollers are arranged in pairs or sets of pairs near the joining edges, converging at an angle in the direction of the movement of the veneers. The rollers thus exert upon the pieces of veneer an elastic downward pressure and at the same time draw them laterally together so as to form as it were the seam, by forcing the glue or binder carrying edges into intimate engagement. Suitable chain, belt or band means may be substituted for these rollers or sets of rollers.

Previously known structures of this general type provided for the individual pressure adjustment of the rollers by spring means or the like, and for vertical adjustment or setting of all the rollers so as to take care of variations in the thickness of the veneer to be mounted, and also for the desired pressure in accordance with the thickness and type as well as kind of material, for example, wood, that may be used for the base. The various adjustments that are to be made in such machines introduced the danger of unequal or unsuitable setting, which is particularly true when it is considered that the operation is frequently left in the hands of unskilled labor. Thin veneers are very sensitive to unequal or uneven pressure, and particularly to excess pressure applied by all or some of the rollers; the edges may warp under such conditions and a clean and unobjectionable joining or mounting is prevented.

The invention overcomes these disadvantages by the provision of means for depth adjustment of all the rollers, and in addition thereto means for adjusting the individual rollers in common in such a manner that the pressure is evenly and uniformly applied to the veneer.

The invention will be better understood from the detailed description rendered below with reference to the accompanying drawings, wherein

Fig. 1 is a schematic representation of a partial side view of a veneer press, omitting all known or unessential details, comprising a carrier frame which is adjustable as to depth and carrying pairs or sets of rollers made and operated in accordance with the invention;

Fig. 2 is a sectional view along lines A—B in Fig. 1;

Figs. 3 and 4 illustrate another embodiment of the invention analogous to the showing of Figs. 1 and 2;

Fig. 5 illustrates a schematic side view of another embodiment of the invention, including the depth adjustment of the roller carrying frame;

Fig. 6 is a section of the embodiment shown in Fig. 5 taken along the lines E—F;

Figs. 7 and 8 show still another embodiment of the invention in schematic side view and in section, respectively;

Figs. 9 and 10 represent a further embodiment of the invention analogous to the showing of previously mentioned figures; and

Fig. 11 shows, on a smaller scale, a schematic plane view of the rollers and their position with respect to the pieces of veneer to be joined or mounted.

Referring now to Figs. 1 and 2, the rollers **1** are provided in sets, each comprising two pairs of oppositely disposed rollers mounted on carriers **2** which are held vertically adjustable by means of studs **3** in the common carrier frame **4**. The pressure of an element **5**, which may be a spring, acts substantially upon the middle of each carrier **2** holding the four rollers **1**. These springs produce the load pressure for the rollers.

In these figures, as well as in other figures, the rollers are shown, for the sake of simplicity of representation, as if they were disposed parallel to the conveyor means. The rollers of each pair are in reality disposed at an angle converging forwardly in the direction of the movement of the veneers and of its conveyor means, as indicated in Fig. 11.

The common carrier frame **4** is mounted vertically adjustable so that the rollers can be adjusted with respect to the thickness of the veneer, and can be lifted from the work in common as a unit.

Each of the springs **5** (there being one such spring for each of the sets of rollers) is acted upon by a pressure stud **6**, and each such stud is arranged for cooperation with a lever arm **7**. These levers arms are mounted in common on a shaft **8** which is provided in bearings on the carrier frame **4**. The shaft **8** also carries a larger operating lever **9**. This operating lever is adjustable by an arrangement including the member **11**, which may be made in the form of an internally threaded knob, in threaded engagement with the bolt **10**.

Tightening or loosening of the knob 11 on the bolt 10 will rotate or angularly displace the lever 9, thereby rotating the shaft 8 and with it all of the levers 7, and will therefore change one way or the other the pressure of all the springs 5, transmitting to the corresponding roller carriers 2 the desired pressure. It will be apparent that the arrangement permits a simultaneous and common adjustment of all the rollers. The adjustment is simple and produces uniform results with respect to the pressure to be exerted on the veneer.

In accordance with the embodiment Figs. 3 and 4, the pressure bolts 6′ for the springs 5 are threaded, each carrying an internally threaded cog wheel 12. Rotation of any of these wheels, assuming of course that the wheel itself cannot move vertically, will lift or drop the corresponding screw bolt 6′ a corresponding amount so as to alter the pressure of its spring 5. Screw wheels 13, each coacting with a corresponding cog wheel 12 and operating in the manner of a worm gear, are for this purpose arranged on the shaft 8′. These gears may be actuated by rotating the shaft 8′ by means of a knob 14, thereby obtaining a uniform and simultaneous adjustment of all the pressure springs 5 in an obvious manner.

It is also possible to rest the springs 5 against a fixed machine part in such a manner that the pressure or tension of each spring is increased upon lifting the rollers 1 and decreased upon dropping the rollers down into engagement with the pieces of veneer. However, such an arrangement has not proved very practical; it does not produce the proper pressure which should always be adjusted in accordance with the thickness of the veneer.

The embodiment made in accordance with Figs. 5 and 6 shows a structure wherein the tension of all pressure springs is automatically altered upon lifting or dropping the rollers with respect to the veneer carrying table or conveyor. However, the increase or decrease of the tension of the spring is not proportional to the distance by which the rollers are lifted or dropped, respectively.

The shaft 8″, shown in Figs. 5 and 6, carrying the pressure transmitting levers 7, which coact with the pressure bolts 6 for the springs 5, is provided with a lever 15. This lever may be actuated by a lever 16 which is journalled on a suitable bracket mounted on the carrier frame 4 and extends at an angle thereto and parallel to the conveyor motion of the veneers. An eccenter 17 acting in the manner of a cam, is mounted in a bearing on a fixed part 18 of the machine, a lever 19 being provided for actuating the cam or eccenter. Now when the entire frame or main carrier 4 with its rollers is lifted or dropped with respect to the work by means of spindles 20, such movement will affect the eccenter 17 and the lever system 16, 15, 7, and the tension or pressure of all the springs 5 will be altered. This alteration, however, will not exactly correspond to the distance by which the carrier frame 4 is lifted or dropped. The amount of change in the tension of the springs as a function of the amount of vertical adjustment of the carrier frame 4 can be obtained by suitable selection and dimensioning of the levers as well as by the point of contact between the cam 17 and lever 16, and also the curvature of the cam or eccenter 17.

The spindles 20 are threaded in their upper portions carrying in threaded engagement worm gears 21. These gears in turn are operable by worms mounted on the shaft 22 which is rotatable by means of the hand wheel 23. The cam or eccenter 17 is adjustable by means of the lever 19, thereby altering or adjusting the tension of all the springs 5 in common. The lever 19 may be provided with a suitable stop pin adapted for engagement with apertures or indentations 24 which are arranged in a segment of the housing 18.

A slightly different arrangement is shown in the embodiment according to Figs. 7 and 8. A shaft or rod 27 is disposed parallel to the direction of motion of the veneer, and may be longitudinally shifted by means of the hand wheel 26 which is in threaded engagement therewith. This shaft or rod carries a number of wedge members or projections, indicated at 25, one for each set of rollers, and each wedge cooperates with a corresponding wedge member carried on the pin or stud 6 which is in engagement with the corresponding spring 5. Rotation of the hand wheel 26 so as to shift the rod or shaft 27 to the left will cause a lessening of the tension of the springs 5; and vice versa, when the hand wheel is rotated so as to shift the rod or shaft 27 to the right, the wedge members or surfaces 25 move the corresponding wedge members 6 downwardly and thereby increase the pressure of the springs.

The embodiment, Figs. 9 and 10, uses a particularly simple means for putting the rollers 1 under the requisite elastic pressure. This means comprises a hydraulically or pneumatically operable hose member or the like indicated at 28. This hose member extends within the carrier frame 4 and acts upon suitable bracket members, each carried on a bolt or pin 29 which in turn is mounted on the corresponding carriage 2 holding the rollers.

As has been said before, the rollers are arranged in sets of four, forming two pairs, on carriages designated at 2 on the drawings. The rollers of each pair are oppositely disposed, each roller engaging one piece of veneer near its edge. These rollers are placed at an angle converging in the direction of the motion of the work, that is, the veneers, as particularly shown in Fig. 11. The veneers, as initially stated, may be moved under the rollers of the press on suitable conveyor means.

ADOLF FRIZ.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

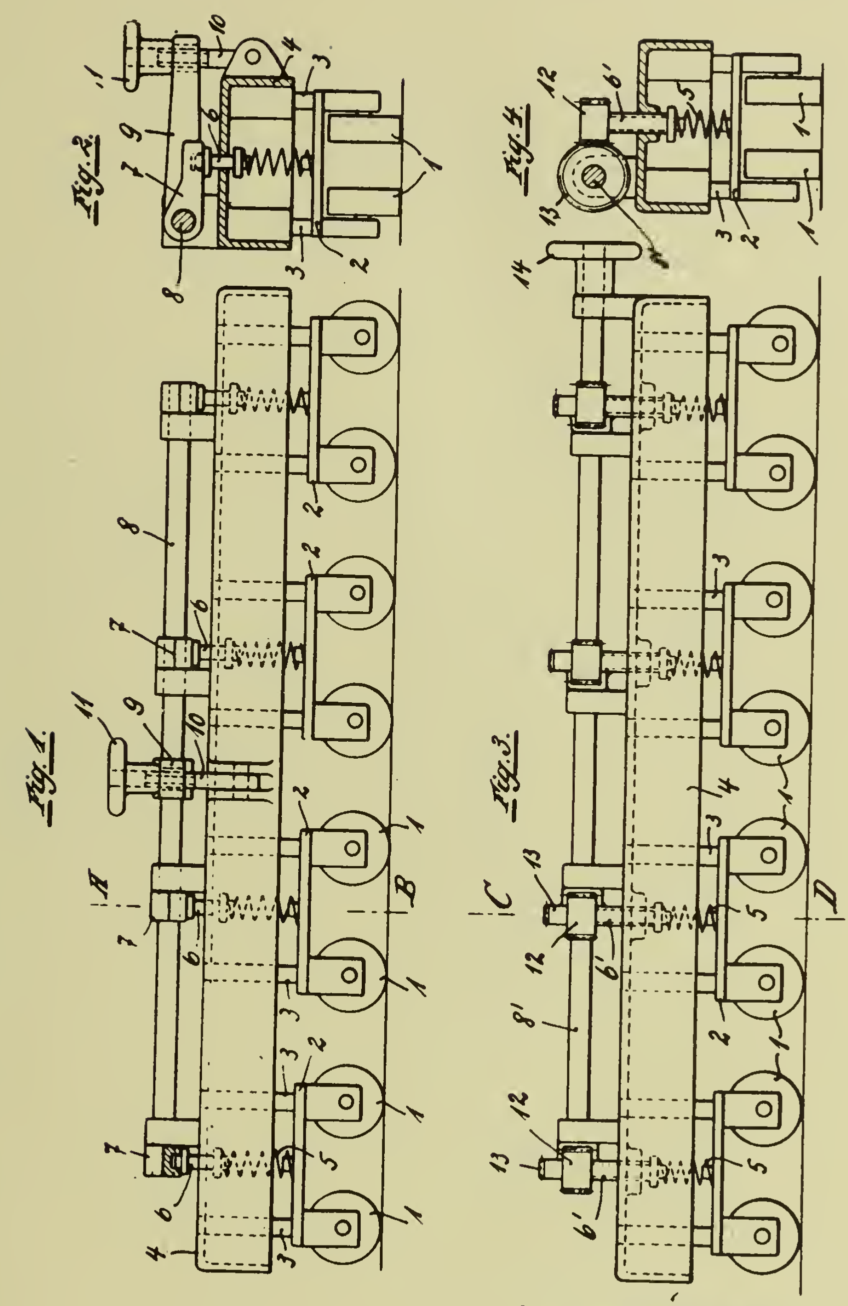
A. FRIZ

VENEERING PRESS

Filed Dec. 13, 1940

Serial No. 370,060

3 Sheets—Sheet 1



Inventor:
Adolf Friz
By Richardson & Auer
Attys.

PUBLISHED	A. FRIZ	Serial No.
MAY 11, 1943.	VENEERING PRESS	370,060
BY A. P. C.	Filed Dec. 13, 1940	3 Sheets–Sheet 2

Fig. 6.

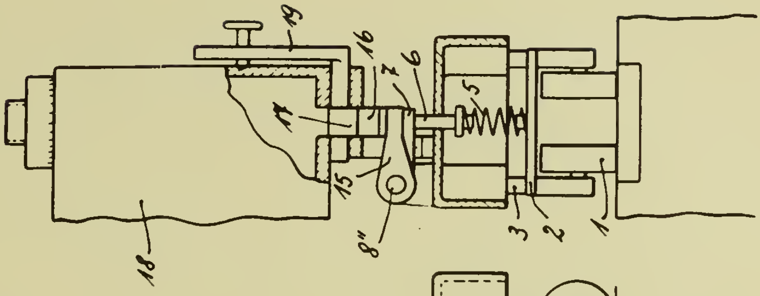
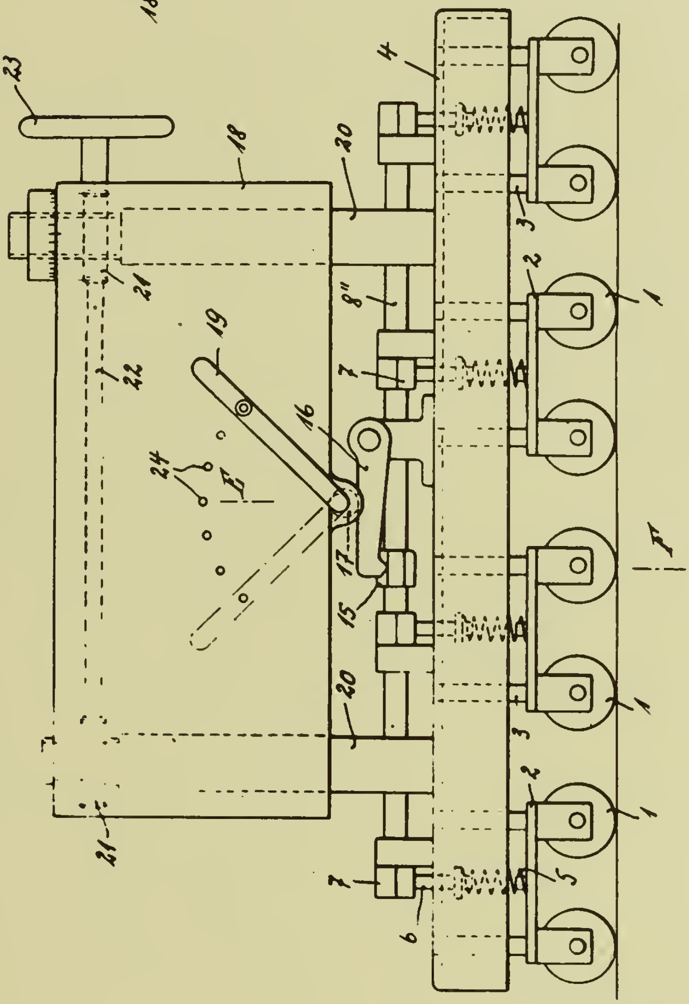


Fig. 5.

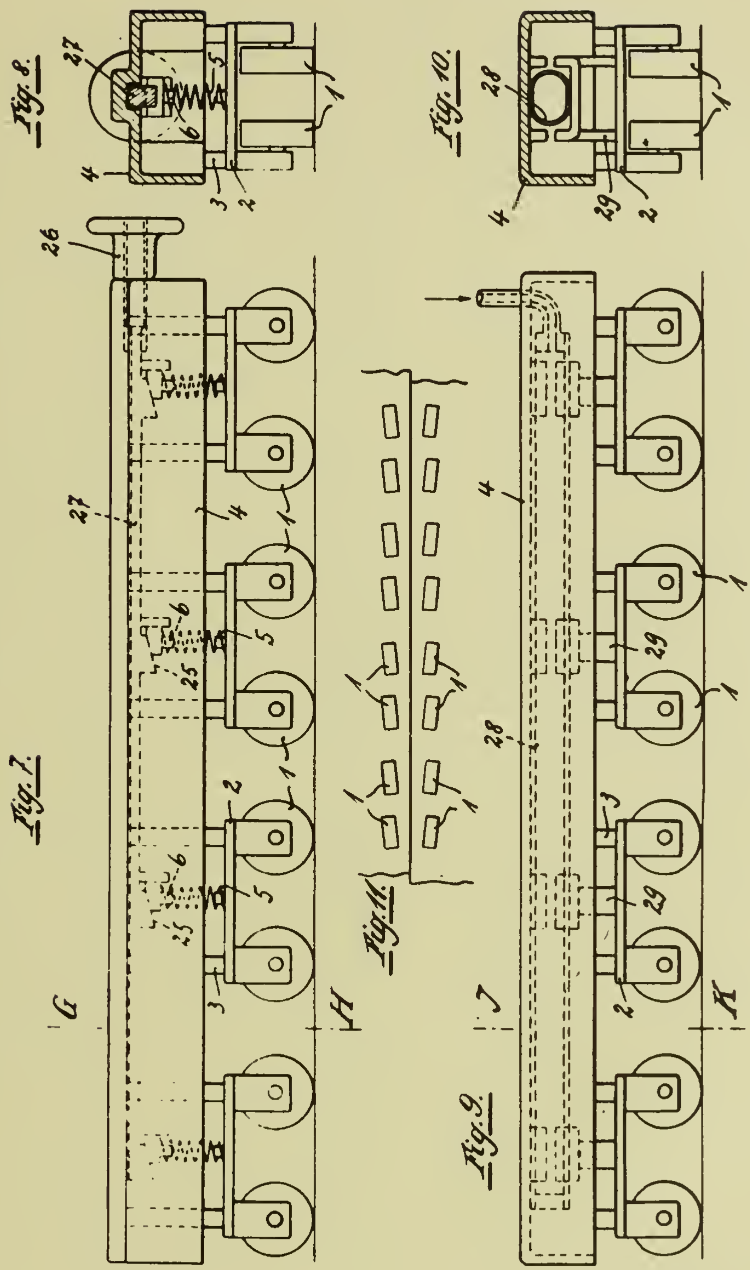


Inventor:
Adolf Friz
By Richardson & Axer
Att'ys

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. FRIZ
VENEERING PRESS
Filed Dec. 13, 1940

Serial No. 370,060
3 Sheets-Sheet 3



Inventor:
Adolf Friz
By Richardson & Geier
Attys.

Published May 11, 1943 Serial No. 370,059

ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR JOINING VENEERS

Adolf Friz, Stuttgart-Bad Cannstatt, Germany; vested in the Alien Property Custodian

Application filed December 13, 1940

This invention relates in general to the art of joining or mounting veneers, and is particularly concerned with a veneer-joining machine built and operated along novel principles resulting in a new and improved joining or mounting method.

The machine forming the subject matter of this invention belongs to the type wherein the veneers are moved by or along a suitable conveyor, past a device which attaches to their edges a suitable binder, glue or the like, whereupon the veneer pieces are laterally pressed together with their glued edges to form a single piece.

A wholly secure and unobjectionable direct bond between such veneer pieces can only be obtained if both joining edges are provided with the binder prior to joining. It is difficult to apply the binder to the edges of the veneers in the same machine which takes care of the joining, because the edges to be joined must lie in the same plane. It has been suggested to use a thin disk between the veneers for applying the binder simultaneously to both edges thereof. This method is not very successful. The binder, instead of being applied to the veneer edges, is largely wiped off. It is practically impossible with this method to apply the binder uniformly, evenly and steadily.

It has also been suggested to bend the veneer pieces at the margins so as to lift the edges out of the plane in which they must lie for the joining step and to apply the binder thereto. It was found that such bending is apt to cause longitudinal breakage or marginal cracks in the veneers, especially in the case of relatively thick sheets.

It should also be mentioned here that it is not practically feasible to hold the veneers apart a sufficient distance to permit the use of two separate devices for applying binder to the edges, because such spacing would interfere with moving the edges together directly in back of such devices so as to accomplish the required intimate engagement which is needed for carrying out the joining.

The present invention proposes a method and operation of the joining and mounting machine, which makes the application of binder means to both joining edges feasible in a simple and efficient manner.

This principal object is accomplished by disposing the guide or conveyor surface for one of the two veneers to be joined, at the place where the binder is applied to the edges, in a plane disposed at an angle to the plane of the guide or conveyor surface for the other piece of veneer. In other words, the machine is provided at its binder-applying section, with two conveyor means running parallel to each other, one for each of the two veneer pieces, and one of these conveyor means is inclined at an angle to the other, thus feeding the corresponding veneer sheet along a different angularly inclined level. Both guide and conveyor surfaces join again in a common plane at the point between the place where the binder is applied and where the joining or bonding is actually carried out, and remain in this common plane throughout the entire bonding section of the machine. The edge of one veneer piece is thus held at a different level and spaced from the edge of the other veneer, for the binder-applying section, giving sufficient space for the use of two separate suitably formed devices for applying the binder to the joining edges. These devices may be disposed at different levels and may also be spaced longitudinally, that is, in the direction of the feeding or conveyor motion of the veneers. Identical or different binder means may be applied by the two devices. For example, one device may apply a suitable glue to the edge of one veneer, while the other applies to the edge of the other veneer a hardening, solidifying, binding, or bonding substance for coaction with the glue applied to the edge of the first veneer sheet.

The term "binder" as used herein is intended to refer, unless otherwise stated or modified, to binder material in general, including substances such as glue, hardening, bonding or solidifying materials and the like.

Another object of the invention is realized by the provision of an elastic or yieldable means, for example, simple leaf springs, for holding down the veneer edges upon their guides or conveyor surfaces at the places where the binder material is applied. Uneven or insufficient application of the binder in case of longitudinally waved or warped edges is thus prevented.

Still another object is concerned with the provision of heating means at the place where the actual joining or bonding of the veneers is carried out. Such heating means may be applied to the bonding seam from above or from below. In the latter case I propose to use a heated conveyor section extending over the corresponding portion of the machine.

The machine for carrying out the new method is characterized by its shortness, saving considerable space, and also by its speedy operation. The veneers can be run through the machine at relatively great speed, saving time and yet furnishing a dependable bond with certainty and dispatch.

The invention will now be described in detail with reference to the embodiments shown in the accompanying drawings. In these drawings—

Fig. 1 represents a schematic side view of the machine with all non-essential or well known parts omitted;

Fig. 2 is a schematic plane view of the embodiment shown in Fig. 1;

Fig. 3 is a plane view analogous to the showing of Fig. 2, of a further embodiment; and

Fig. 4 shows, on a larger scale, a section along the lines A—B of Fig. 1.

The veneers to be joined are not shown in Figs. 1–3, but are indicated in the sectional view, Fig. 4. Like parts are indicated by like reference characters throughout the drawings.

The pieces of veneer *a* and *b* (Fig. 4), which are to be joined at their edges, are moved along a table by means, such as endless belt conveyors or chain conveyors *d* and *e*, which may be disposed within suitable guide grooves in the table *c*.

In the embodiment according to Figs. 1 and 2, these chain or belt conveyors operate from the drums *f* and *g*, at one end of the table to the drums *h* at the other end thereof. In other words, there are two separate oppositely disposed conveyors *e* and *d* extending substantially throughout the table, as indicated in Figs. 1 and 2. An additional conveyor *u* is disposed between the drums *i* and *h* only for that section of the machine along which the actual joining or bonding of the veneer pieces is accomplished. The purpose of this additional conveyor section will be subsequently described more in detail.

The drum *g* for the conveyor section *e* is placed at a lower level than the drum *f* for the conveyor section *d*, and therefore the chain or belt conveyor *e* will extend throughout substantially parallel to the horizontal surface of the table *c*, while part of the conveyor *d* extends at an angle thereto from its terminal drum to the point where the drum *i* is located. At this point the conveyor *d* will again join the plane of the chain or conveyor *e*. As shown in the drawings, the inclination of the chain or conveyor *d* is relatively small. The section of the table c taking the inclined conveyor portion is, of course, inclined in the same manner. A guide rib *k* is arranged between the inclined table surface and the substantially horizontal table surface. This rib is placed between the two conveyor sections *d* and *e* for the purpose of guiding the two veneer pieces *a* and *b* which are to be joined and mounted on the table.

The machine is thus divided into what may be called a "binder-applying section" extending between the drums *g—f* at one end and the drum *i*, comprising two separate conveyors which are disposed parallel to each other but move along different levels at an angle to each other, and a "bonding section" extending roughly from the drum *i* to the drum or drums *h* at the other end, this bonding section comprising two conveyors (*d—e*) which are disposed parallel to each other and move in the same plane.

Guide and pressure rollers *m* are arranged above the table in the usual manner, exerting preferably yieldable downward pressure upon the veneer sheets. These rollers may be arranged in pairs, as shown in Fig. 3, and may be at an angle converging in the direction of the feeding or conveyor motion. Such guide or pressure rollers are arranged throughout the entire machine, as indicated in Fig. 1, although they have been omitted from Fig. 2 and from the right side of Fig. 3 in order to avoid encumbering the drawings.

Yieldable or elastic holders or pressure members, for example, leaf springs *n* and o are arranged at the places where the glue or other binder is to be applied so as to press down the veneer edges to assure uniform and even application of the binder, as previously mentioned.

Two devices are provided for applying the binder to the corresponding edges of the veneers. They comprise the cone-shaped rollers *q* and *r*, for applying binder to the veneers *a* and *b*, respectively. It will be noted that the rollers are so arranged that their rims are disposed perpendicular to the respective veneer edges. The binder is thus applied to the veneer edges in a rolling action instead of a wiping action. These binder rollers are driven by suitable pulleys, indicated at *q'* and *r'*, respectively. Binder is fed to the roller *q* from the container *s* and to the roller *r* from the container *t*. These rollers, together with their corresponding containers, are arranged so that they can yieldably follow the corresponding edges of the moving veneers. The binder applicator *t*, associated with the roller *r*, is preferably arranged at the level above the table *c*, while the applicator *s*, co-operating with the roller *q*, is arranged below the corresponding table section.

The two pieces of veneer are thus fed from right to left, as seen in Figs. 1 and 2, the edges being guided by the rib *k*. As the veneer edges pass the binder applicators *r* and *q*, the binder is applied in an obvious manner. Near or at the place where the drum *i* is situated, the veneer *b*, which was kept at a lower level, joins the level of the veneer *a*. The binder-carrying edges move into engagement with each other by the action of the converging rollers *m*, and while they are in intimate engagement they are moved along the substantially horizontal stretch of the table of the machine. This stretch or bonding section is dimensioned long enough to warrant completion of the desired bond between the two veneer pieces.

In order to facilitate the bonding operation. I have provided heating means, as indicated at *t'* (Fig. 1), acting upon the seam from above, and, in addition, heating means which acts upon the bonding seam from below. This latter heating device may be made in the form of a heated conveyor section *u* (Fig. 2) which extends only over the bonding section of the machine or one part thereof. This latter heating arrangement is designated at *v* in Fig. 1. It may be separate from the conveyor *u*, or it may be arranged within the conveyor section *u*. An electrical heating arrangement may be used for this purpose.

Instead of using a conveyor section *u*, which is disposed between the conveyor sections *d* and *e*, as shown in Fig. 2, extending only over the bonding section of the machine, a single endless chain or belt conveyor *w* may be used, which extends, as shown in Fig. 3, between the drums *i'* and *h*. The conveyor sections *d* and *e* are separate in this case, the section *d* extending between the drums *i* and *f*, and the section *e* extending between the drums *i''* and *g*. The large left hand conveyor chain or belt *w*, operating substantially throughout the bonding section of the machine, may be heated from below at its central section located underneath the bonding seam of the veneers which are moved by or over it.

ADOLF FRIZ.

PUBLISHED MAY 11, 1943. BY A. P. C.

A. FRIZ

METHOD AND APPARATUS FOR JOINING VENEERS

Filed Dec. 13, 1940

Serial No. 370,059

Fig. 1.

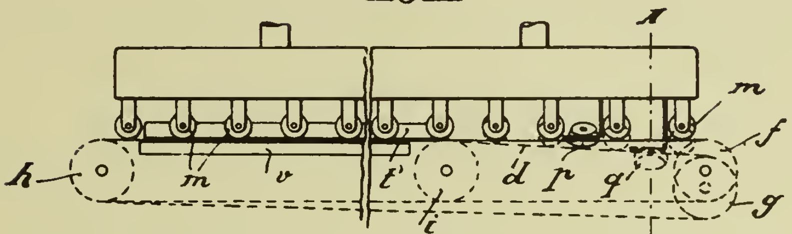


Fig. 2.

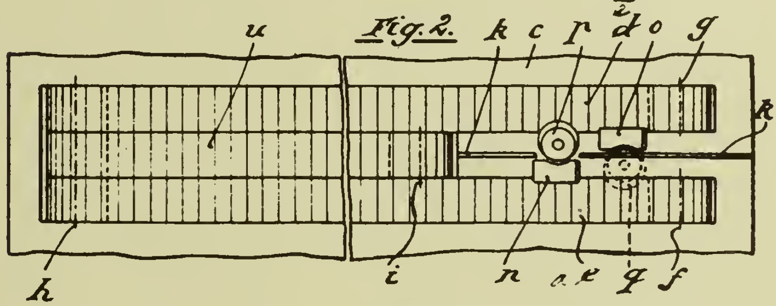


Fig. 3.

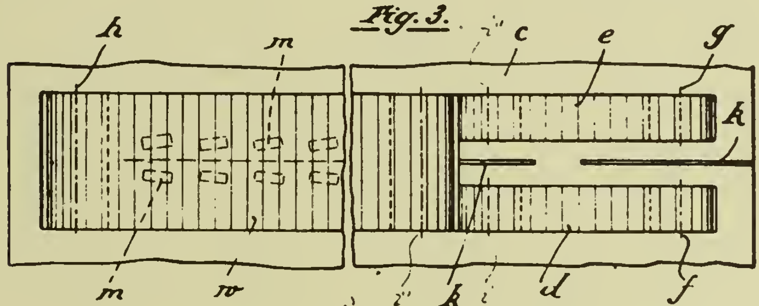
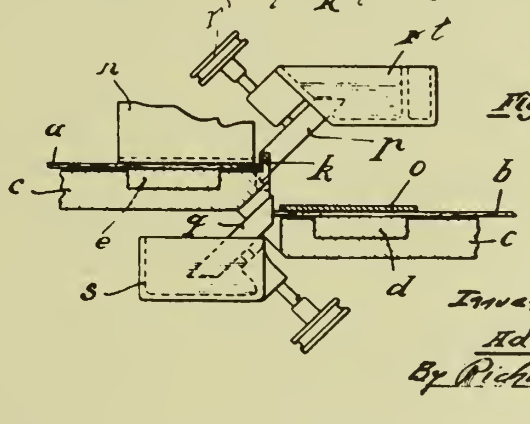


Fig. 4.



Inventor:
Adolf Friz,
By Richardson & Fuller
Att'ys.

Published May 11, 1943 Serial No. 370,141

ALIEN PROPERTY CUSTODIAN

PERCUSSIVE TOOLS OPERATED BY AN INTERNAL COMBUSTION ENGINE

Josef Wohlmeyer, Berlin, Germany; vested in the Alien Property Custodian

Application filed December 14, 1940

This invention relates to pile-drivers, pile drawing devices, squarers, rock drills, hammers etc. or—generally spoken—to a percussive tool of any kind which embodies its power supply in the form of an internal combustion engine in the same unit.

The percussive tools of this kind, which have hitherto become known, can only be operated with a relatively small number of strokes per unit of time, as it was necessary to provide long strokes in order to obtain the desired powerful impulses transmitted to the operative tool of the machine. One aimed at increasing the speed of the engine and thereby increasing the efficiency. To this end the engine has been so constructed that during or at the end of each return stroke an air cushion was created which braked the operative member of the tool in its return movement and thereafter accelerated the same in forward direction. The air cushion, however, proved practically ineffectual. The speed of the engine could be somewhat increased, but not to the extent desired. Besides this the air cushion is disadvantageous as the creation of the air cushion causes a sudden increase of the air pressure; in consequence hereof the stationary or non-operative members of the tool must be very heavy in order to avoid jumping thereof.

The mentioned disadvantages exist also in percussive tools equipped with two combustion chambers whereby the forward stroke as well as the return stroke of the operative tool member is caused by internal combustion. The invention is based on the calculation, that practically the efficiency of a percussive tool can only be improved by increasing the speed of the engine; by increasing the weight of the operative member of the tool the spread decreases so that practically increasing of the efficiency cannot be expected. At a definite weight of the operative member of the tool the speed of the engine can only be increased by shortening the stroke.

The invention particularly relates to percussive tools of any kind, whereby, however, the return stroke of the operative member is caused by internal combustion, while the forward stroke is exclusively or essentially caused by an elastic pressure means; it is of no importance, whether the cylinder or the piston of the tool is used as operative member, and whether the fuel is injected into the combustion space or introduced in a gasified state; finally, the invention is not tied to a special arrangement and construction of the combustion chamber and also not to a special kind of scavenging.

In connection with percussive tools mentioned above the invention consists therein that the tension of the means acting upon the operative tool member in the direction of the forward stroke is continuously maintained. It is of special advantage if the said pressure is regulable. The pressure means may consist of a spring or of a gaseous pressure medium. In case of a gaseous pressure medium it is recommended to provide a space which is several times larger than the volume about which it is made smaller by the operative tool member during the return stroke. If the disposable volume is too small the pressure medium space of the tool may be connected to a separate pressure medium chamber outside of the tool.

The charging of the pressure medium space may be effected by introducing compressed air or any other gas under pressure. It is also possible to charge the space by introducing a combustible liquid or substance which produces gases when ignited.

Supplemental charges which may become necessary due to leakiness can be performed in the same manner as the main charge. It will, however, be more advantageous to provide a separate compressor or to combine with the tool an automatic pump the cylinder of which is arranged in or on the stationary respectively non-operative part and he piston of which is arranged in or on the operative member of the tool or vice versa.

The supplemental charge by means of a compressor or pump is recommendable, as—without deranging the operation of the tool—the pressure medium contained in the pressure medium space can be used for starting the tool in a principally new manner. In a corresponding manner the pressure medium can be used for operating the fuel injecting pump or the igniting device and, if desired, auxiliary devices as f. i. the lubricating pumps, the water circulation pump etc.

The utilization of the pressure medium for starting the tool may be realized thereby that the operative tool member is provided with a circular face to which pressure medium is admitted in the direction of the return stroke and which is of larger area than the face loaded with the pressure of the gaseous medium. The mentioned circular face may preferably consist of the under face of the scavenging piston.

The pneumatically operated auxiliary apparatuses, as f. i. the injecting pump, the igniting device, the lubricating pump etc., are prefer-

ably connected to an intermediate chamber of the non-operative part of the tool, which chamber is alternately ventilated and filled with pressure medium in accordance with the working rhythm of the tool. The advantage of the pneumatical operation compared with the mechanical operation hitherto provided consists therein that the operative mechanism and the operated devices are not affected by percussive strains.

The invention also comprises the possibility of starting the tool by means of any other disposable gaseous pressure medium provided that it can be admitted in a regulable quantity.

Further features of the invention will be apparent from the description given hereafter.

The accompanying drawings illustrate two modes of carrying out the invention.

Fig. 1 and Fig. 2 are longitudinal sections, of two pile-drivers, whereby the inventive features are shown partly in connection with Fig. 1 and partly in connection with Fig. 2.

Fig. 3 is a schematical side elevation of a complete pile-driver plant.

In carrying my invention into effect in one convenient manner as, for example, in its application to a pile-driver and as illustrated in Fig. 1 and Fig. 2 I combine the tool with an internal combustion engine of suitable form and construction and operating upon the two-stroke cycle principle and of a power capacity suited to the nature of the work which the tool is required to perform.

The housing **1** of the pile-driver is provided with a bore **2** serving as combustion space whereby the conventional cylinder head is replaced by a cylindrical extension co-axial with the bore **2** and adapted to take a piston **3** serving as anvil. At the upper and of the combustion space exhaust openings **4** are provided. The operative member of the tool is constructed as piston of differential diameters; it comprises the percussive piston **5**, the scavenging piston **6** and a piston **7**. The several pistons may be hollow as f. i. the piston **7*a*** in Fig. 2.

The scavenging piston works with its upper face **8** as scavenging pump, which introduces the gaseous scavenging medium (air or combustible mixture delivered by a carburetter) through openings or channels **9** into the combustion space **2**.

The piston **7** extends into a chamber **10**, in which a certain gas pressure is maintained during the whole period of operation. The height of this pressure and the weight of operative tool member are decisive for the percussive power of the tool. Hence the percussive power can be regulated by increasing or lowering the gas pressure.

The lower face **11** of the piston **6** is used as means for starting the tool. This face is larger than the face **7*b*** of the piston **7** and **7*a*** respectively so that a differential power in the direction of the return stroke is created if the same pressure fluid—namely the pressure gas in the chamber **10**—is admitted to both faces. The admittance of the gas to the face **11** is controlled by a device comprising a cylinder **12** and a piston **13** provided with a circumferential channel. The cylinder **12** is connected through the channel **15** to the chamber **10**, through the channel **16** to the circular space **17** below the face **11**, and through the channel **18** to the atmosphere. The piston **13** is longitudinally bored, this bore being adapted to take the piston rod **19** which extends through both covers of the cylinder **12**. The piston **13** can be raised against the action of the spring **21** by means of a lever **20**. The piston rod **19** is provided at its upper end with indentations **24** through which in the lower position of the piston rod (as shown in Fig. 2) the space **22** above the piston **12** has open connection with the atmosphere. In a radial bore of the piston **13** a spring-loaded ball **23** is provided which engages a circumferential groove of the piston rod **19** thereby coupling the piston **13** and the piston rod **19** with each other. The space **22** is connected to the scavenging cylinder **26** by means of the channel **25**.

The piston **6** is provided with a downward directed pipe-like extension **27** connected to the chamber **10** through the channel **28** and guided in the bore **29** of the housing **1**. The pipe **27** is closed at its lower end by a valve **30** which can be lifted from its seat **33** by means of a rod **33** the position of which can be regulated by a lever **31**. The bore **29** is connected through the channel **34** to a chamber containing a pressure medium and adapted to take the piston **35** which operates the fuel injecting pump **36** or an igniting device if a combustible gaseous mixture is introduced into the combustion space. A ventilating bore **29*a*** is provided above the valve seat **33**.

The regulating rod **37** of the fuel injecting pump **36** is connected to a piston **38** one face of which is loaded by a spring **39** while the opposite face is loaded by the pressure maintained in the chamber **10** and transmitted through pipe **40**. The spring **39** tends to drive the piston **38** into its position of rest in which a minimum quantity of fuel is injected.

The tools illustrated are provided with pumps which automatically supplement the charge of the chamber **10**. In case of Fig. 1 the pump comprises a piston **41** guided in a corresponding bore **42** of the piston **7**. The bore **43** of the piston **41** is alternately connected through valves **44** to the atmosphere and the chamber **10** respectively. In case of Fig. 2 the charging pump comprises a piston **45** extending from the piston **6** in downward direction and guided in a bore **46** of the housing **1**. The pump is provided with two valves **48** the upper one of which serves as outlet valve and controls the connection through the channel **47** to the chamber **10**.

In the embodiment shown in Fig. 2 a fuel supply tank **71** and a lubricating oil tank **72** are provided on the upper end of the tool. The chamber **10** is provided with a charging opening normally closed by an automatic valve **49**.

According to Fig. 1 the ignition space is formed by a circumferential groove **50** in the wall of the combustion space **2**; in case of Fig. 2 the ignition space is formed by cavities **51** in the piston **5** and the anvil piston **3**.

The cooling of the tool is illustrated in Fig. 1. The combustion space **2** is surrounded by a cooling jacket **52**; the anvil piston **3** is provided with a hollow space **53** connected to the jacket **52** through the opening **54** and to the inlet **56** for the cooling medium through the opening **56**. The cooling medium leaves the jacket **52** at **58**.

Fig. 3 shows schematically the side elevation of a pile-driver **60** with inlet **56** and outlet **58** for the cooling medium. The flexible pipes **61** and **62** connect the cooling jacket of the tool to a conventional cooler **63**. The motor **64** drives the blower **65**, the water circulating pump **66** and the compressor **67**, these machines being mounted on the compressed air vessel **69**, which in turn

is carried by wheels **70**. The vessel **69** is charged by the compressor **67** and has open connection with the pressure medium chamber **10** of the tool.

The service and the operation of the illustrated tools are as follows:

The chamber **10** is first charged with pressure fluid, f. i. compressed air which is admitted through valve **49**. Thereafter the piston rod **19** and the piston **13** are raised into the starting position by means of the lever **20**. The pressure medium can now flow from the chamber **10** through the channels **15** and **16** into the circular space **17** and drive the operative tool member **5, 6, 7** upwardly. As soon as the lower edge of the piston **6** slides over the mouth **25***a* of the channel **25**, the pressure medium will flow through the channel **25** into the space **22** and drive the piston **13** downward into its initial position. Hereby the piston **13** can slide over the piston rod **19** due to the elastic ball coupling. The piston rod **19** is returned into its initial position by the spring **21** as soon as the lever **20** is left free. The space **17** has now open connection through the channel **18** with the atmosphere, so that the operative tool member will perform the first working stroke.

By using pressure fluid for starting the tool the pressure in the chamber **10** will decrease more or less; in consequence thereof the spring **39** pushes the piston **38** towards its initial position, so that only a reduced quantity of fuel is injected. Hereby the working member **5, 6, 7** is prevented from raising too high due to the reduced counter-pressure within the chamber **10**. As soon as the gas pressure increases the injected quantity of fuel is automatically increased too. Additional hand-operated means for regulating the injection may be provided, if desired.

As soon as the operative member **5, 6, 7** reaches the anvil **3** or shortly prior to this moment the valve **30** is raised from its seat **33** by the rod **32**, so that pressure fluid is admitted through the bore **28** and the channel **34** to the piston **35** and drives the latter towards above. Hereby the pump **36** is operated which injects a certain quantity of fuel into the combustion space. During the combustion the operative member moves upwardly; the pipe-like member moves upwardly too so that the channel **29***a* becomes free and the piston **35** can return into its initial position. In the same manner f. i. a lubricating oil pump can be operated, which preferably is also connected to the piston **35**.

During each second stroke the pump **41, 42** respectively **45, 46** delivers compressed air into the chamber **10**. The pump is so measured that it can supply the maximum air quantity which may be required. The air exceeding the quantity required may be exhausted through an automatic pressure valve.

If desired and particularly in connection with large percussive tools an auxiliary unit as shown in Fig. 3 may be provided.

The motor **64** drives the blower **65** and the water circulating pump **66** of the cooler **63** hereby securing the cooling of the internal combustion engine of the tool. The motor **64** further drives the compressor **67** which supplies compressed air into the vessel **69** connected to the chamber **10**.

If the auxiliary unit according to Fig. 3 is used, it is of course not necessary to provide the tool with a pump for supplementing the charge of the chamber **10**. On the other hand the auxiliary unit will be more simple by omitting the compressor **67** and eventually the vessel **69** too, if a pump for supplementing the charge is provided and if a separate pressure fluid source for initially charging the chamber **10** is disposable.

If a driving motor is provided in either case, the blower, the water circulating pump and the compressor may be provided with means for coupling them with the said motor. Pile-driving plants are usually provided with a motor operating a windlass and supported by the trestle of the plant. In this case the mentioned auxiliary engines may be mounted on the trestle and coupled with the windlass motor.

JOSEF WOHLMEYER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. WOHLMEYER
PERCUSSIVE TOOLS OPERATED BY AN
INTERNAL COMBUSTION ENGINE
Filed Dec. 14, 1940

Serial No.
370,141

2 Sheets-Sheet 1

Canceled
9/12/41

Fig.1

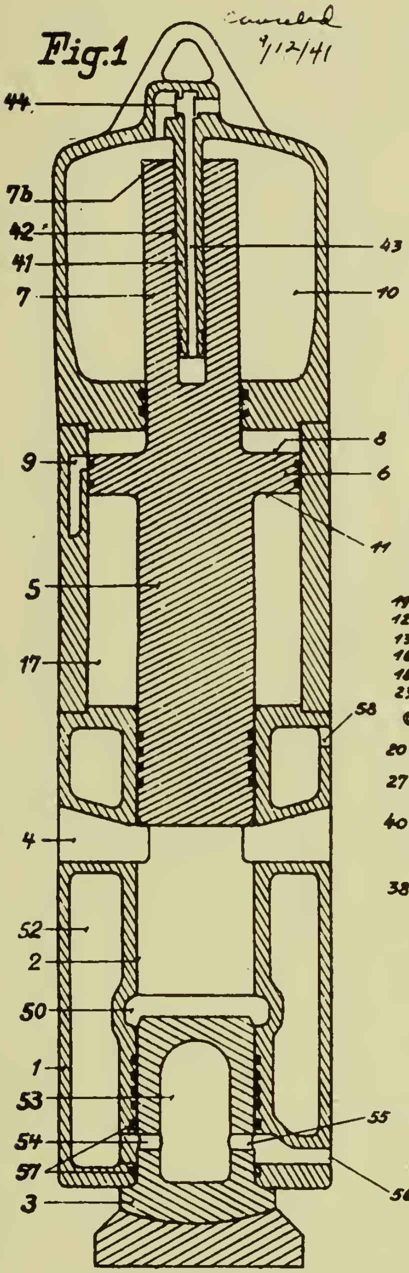
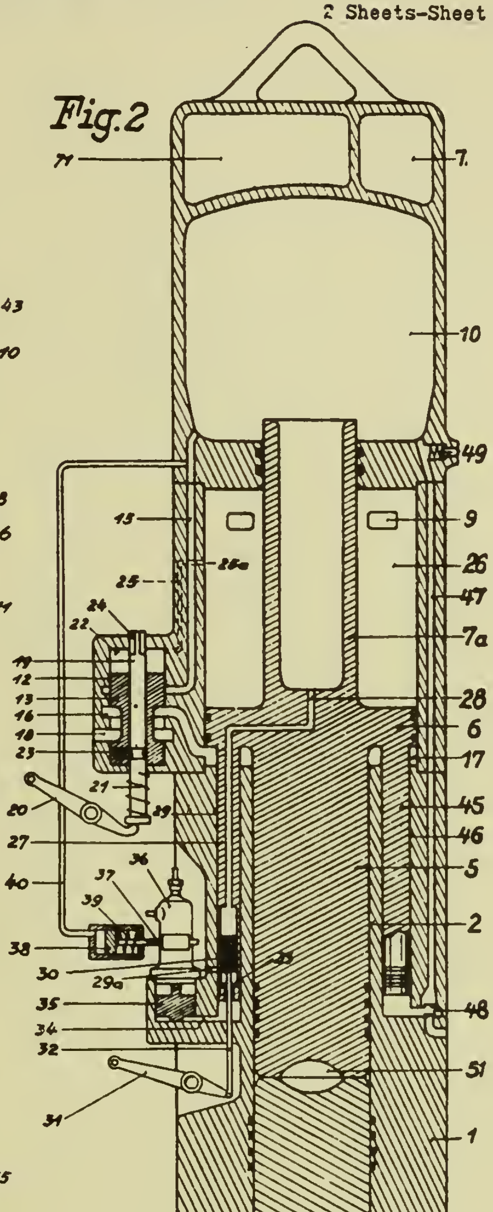


Fig.2



INVENTOR
JOSEF WOHLMEYER

By Kiddle, Bethell & Montgomery
ATTORNEYS

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. WOHLMEYER
PERCUSSIVE TOOLS OPERATED BY AN
INTERNAL COMBUSTION ENGINE
Filed Dec. 14, 1940

Serial No.
370,141

2 Sheets-Sheet 2

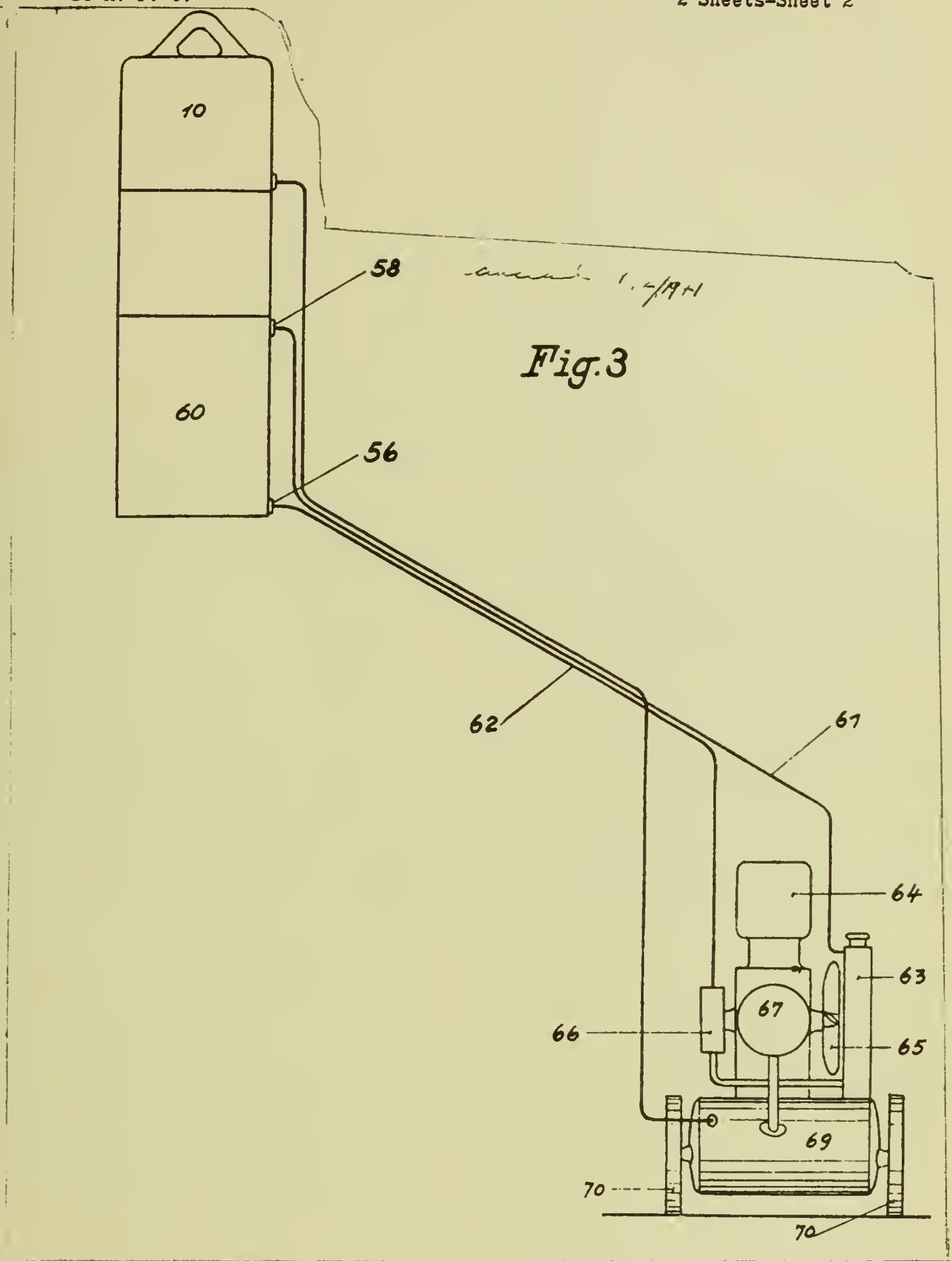


Fig. 3

INVENTOR
JOSEF WOHLMEYER
By Kiddle, Bethell & Montgomery
ATTORNEYS

Published May 11, 1943 Serial No. 371,834

ALIEN PROPERTY CUSTODIAN

PROCESS FOR INCREASING THE EFFICIENCY OF INSECT DESTROYING DRUG EXTRACTS

Jean Komeda, Schaerbeek-Brussels, Belgium; vested in the Alien Property Custodian

No Drawing. Application filed December 26, 1940

The various drugs, such as pyrethrum or insect flowers, those known in French terminology as derris or deguelie, cubée or tachigalie, etc., have acquired an increasing importance in the destruction of insects. For using them, the plants are ground, after having been previously dried, and the powder obtained in this manner is applied by pulverization. By acting in this manner a small portion only of the useful principles contained in the powder is used, or, alternatively, the effect of the latter is so slow, that great quantities of such powders are to be used for obtaining satisfactory results. Therefore this manner of proceding was soon improved by isolating the active principles of the plants by extraction, so as to obtain them in a pure and concentrated form. The extracts so obtained were used by vaporizing more or less concentrated solutions. For extracting these active principles there are used nearly exclusively organic solvents, such as benzene, acetone, carbonic acid, carbone tetrachloride, etc.

It has been found according to the present invention, that the insect destroying properties of these products, obtained by extraction, can be increased in very great proportions, if extraction is performed in presence of organic or inorganic acids. For instance, it has been possible to increase by 50% the insect destroying effect of an extract from pyrethrum flowers or insect flowers, if the latter is prepared by means of carbon tetrachloride in the presence of phosphoric acid and of formic acid. With the extract obtained in this manner, used in solution a more complete and quicker mortality of the insects was attained.

Moreover, it has been proved to be a further advantage of this process, that, by an acid extraction there is quantitively obtained a greater quantity of extract, this being an important economy of used starting materials.

Example 1

400 gr. of finely ground pyrethrum flowers, are treated with a mixture of 3.5 kg. of carbon tetrachloride and 0.5 kg. of formic acid. The extract so obtained, as compared with an extract obtained normally, in which the same quantity of pyrethrum flowers would have been treated with 4 kg. of carbon tetrachloride has shown an increase of 20% of insect destroying effect, under identical experimental conditions.

Example 2

400 gr. of finely ground pyrethrum flowers, were treated with 3.4 kg. of carbon tetrachloride, 0.5 kg. of formic acid and 0.1 kg. of phosphoric acid. The extract obtained in this manner has shown, as compared with the extract obtained by a normal extraction merely with carbon tetrachloride, an increase of the insect destroying effect of 50%, under identical experimental conditions.

JEAN KOMEDA.

Published May 11, 1943 Serial No. 372,674

ALIEN PROPERTY CUSTODIAN

APPARATUS FOR THE LONGITUDINAL CREPING OF WEBS OF PAPER OR OTHER SHEET MATERIAL

Rudolf Haas, Berlin-Zehlendorf, Germany; vested in the Alien Property Custodian

Application filed December 31, 1940

This invention relates to apparatus for the longitudinal creping of webs of paper or other sheet material.

The continuous longitudinal creping of webs of paper and other sheet material has heretofore been carried out by enclosing the web within two surfaces and by applying creping tools moving forward on one or both sides of the web along an oblique inwardly directed line, whereby the web will be gradualy shoved together.

Practically, this procedure is accomplished in the following manner. The web is carried through a rotating cylinder which, for instance, consists of a grate and a ribbon moving with said cylinder, said ribbon being of a width corresponding to the width of the web at its place of entrance into the creping apparatus, while the creping tools are working through the slots of the grate to grip the web, inward and outward motion of said tools being controlled by fixed cams provided in the interior of said cylinder.

This process, although it has been used with some success in the manufacture of creped paper, is connected with certain disadvantages, which are avoided by my present invention.

However, when using this process, the creping tools, which are working through the slots of the grate by gripping the web on either side thereof and shoving it together, can only be prevented against damaging the surface of the ribbon moving with the web, if a moderate pressure is applied to the ribbon. In consequence of this, the web will tend to form only relatively coarse longitudinal creases, unless it is subjected to creping in very moist condition. However, creping in moist condition is not permissible, because the web must be shifted relatively to the ribbon moving with the cylinder, such shifting being connected with the danger, that in case of an excessively moist web the surface and fibrous structure of the latter will be liable to be damaged. With the known process, accordingly, there can be attained only a longitudinal creping which is of considerably greater coarseness than the transverse creping as a rule preceding the former. This is not desirable for many purposes of application.

In order to prevent damage to the ribbon moving with the cylinder, it had also been tried to cover up the creping tools which exert a pressure on the ribbon by the margins of the web at the place of entrance into the creping apparatus, thus avoiding any direct contact between the ribbon and the creping tools. This, however, results in the disadvantage that a part of the width of the web does not participate in the process of longitudinal creping, so that there will be undesirable losses of paper or the like at the margins of the web. These losses are especially of importance in case of creping webs of bituminous paper, because the margins of the web which are soaked with the bitumen cannot be subsequently supplied to the paper machine or dressing plant.

Moreover, such covering up of the creping tools by the margins of the web in case of transit from one to another width will require a change of the position of the place of entrance of the ribbon which rotates with the cylinder, and in addition proper readjusting of the position of the ribbon. Such readjusting, however, is connected with a waste of time and labor. There will be similar difficulties at the place of exit, a varying width and thickness of the web also necessitating a varying width of the creped web at the place of exit.

By my present invention, now, I have devised an improved apparatus for the longitudinal creping of webs of paper and the like. My new apparatus is distinguished not only by its simplicity in a technical respect, but also avoids the aforementioned disadvantages inherent to known apparatus or processes of this kind.

My invention consists essentially therein, that the web of paper or the like to be creped is pressed against the periphery of the grooved cylinder by means of a fixed mantle tapering in the direction of motion of the web, and that the creping tools are arranged to move inwardly along or underneath the longitudinal edges of said mantle.

Accordingly, my invention is not limited to the replacing of the heretofore used ribbon moving with the cylinder by a fixed mantle. In addition to this, according to my invention this fixed mantle is of proper conformation tapering in the direction of motion of the web, and furthermore the creping tools are guided during their inward motion along or underneath the longitudinal edges of said mantle.

This tapering conformation of the fixed mantle and the guiding of the creping tools along or underneath the longitudinal edges of said mantle, which edges form a closed space for the margins of the web to be creped, will permit to arrange the creping tools in such a manner, that they will come into action onto the web in lateral direction and that, in spite of this, there will be avoided in the first place a direct or indirect contact between said tools and the web, and in the second place, any pressure exerted by said tools against

said mantle which keeps the web in depressed condition. In consequence of this, said mantle can be pressed with such a force against the rotating cylinder that sufficiently fine longitudinal creases will be formed on the web, without, however, requiring an excessive moistening of the latter for increasing its ability of being formed. In this way the aforementioned disadvantages connected with such moistening are successfully avoided.

The action of the creping tools onto the web in direction from the margin of the latter has the further advantage of avoiding any losses of paper, as the longitudinal creping is caused to extend as far as to the edges of the web.

For the same reason by my invention also the necessity of providing any kind of readjustment at the place of entrance of the paper during transit from one to another width of the web will be dispensed with. More particularly, according to my invention any width of the web—within the maximum width defined by the size of the creping apparatus—will come at the proper time into the range of action of the creping tools at the point of intersection with the path of motion of the latter.

An especial further advantage of the apparatus forming part of my present invention consists therein that there is a considerably greater liberty with regard to the selection of the material for the mantle and the means for pressing the same against the web, as compared with the use of a rotating web.

In order to explain this advantage, attention may be called to the course of the process of creping. This process commences at the margins of the web where it is creased and simultaneously therewith upset at the place of the creases. The length of the crease thus produced and therewith the size of the creping will be the smaller, the greater the pressure is at a given rigidity of the paper, this pressure being exerted by the surface acting onto the rotating cylinder, or in other words, the smaller the gap available for the paper during being upset between the mantle and the cylinder. If now a certain number of creases has been formed, the paper mass accumulated in these creases will then also be more and more upset in direction of its height, thus enlarging the original distance between the mantle and the cylinder. Accordingly, the creases now adjoining the former creases will be of greater size, because the space available for these creases had been increased. From this explanation it may be seen that a fine and uniform longitudinal creping can only be attained, if the pressure, with which the mantle is pressed against the rotating cylinder during the course of the operation of creping, is exerted in such a manner that immediately in the rear of the continuously increasing width and thickness of the bead the distance between mantle and cylinder is not essentially greater than it had been at the margin of the web at the beginning of the operation of creping.

This part of the operation of creping is represented diagrammatically in Fig. 1 of the drawings. In Fig. 1 *a* designates a part of the cross-section of a rotating cylinder forming part of a creping apparatus. This cylinder is provided with grooves *b* which serve not only to move the web *c* with the cylinder, but also to move the creping tools *d*. The mantle, which does not participate in the rotation of the cylinder, is indicated at *e*. The operation of creping beginning from the margin of the web is supposed to have already proceeded so far that a greater number of crepe creases has been formed, which taken together will result in a beaded or thickened part *f* of the web. This beaded or thickened part of the web will cause the mantle *e* to be lifted somewhat from the cylinder *a*, which process cannot be avoided without applying impermissibly large mechanical forces. The place where at a time the new crepe creases adjoining the former creases are formed is at *g*. It is of importance that at this place, as Fig. 1 shows, the distance between the mantle *e* and the cylinder *a* will not become excessive and, accordingly, care must be taken to maintain at every place of the mantle *e* the proper distance between the latter and the cylinder *a*. This is accomplished according to my invention by giving the mantle *e* a proper conformation and especially by properly constructing the device which presses the mantle against the cylinder, this device being indicated in Fig. 1 by arrows *h*, *i* and *k*. In case of a rotating ribbon this condition can be fulfilled in known processes only by making the ribbon of yielding material, for instance rubber, and by using only a small pressure for the above stated reasons. This small pressure is all the more necessary in view of the fact that in case of a rotating ribbon the place of the bead will be steadily moving from the outside towards the inside which will cause a permanent change of the shape of the ribbon.

On the other hand, in case of using the fixed mantle according to my invention, the two beads which are produced at increasing width in direction from the right towards the left during the operation of creping, will always remain at the same place with respect to the mantle. Accordingly, besides elastical materials also hard metallic materials and, therefore, materials with an especially smooth surface may be used, if care is taken that the conformation of the mantle is in conformity with the bead produced underneath the web when moving underneath the mantle.

The latter condition can be fulfilled either by making the mantle from thin sheet metal, in which case the mantle will adjust itself to the form required by the paper during a short time of operation of the creping apparatus, or also by shaping the mantle from the start in such a manner that the marginal surfaces are at a greater distance from the cylinder than the intermediate surface, and that these marginal surfaces forming so-to-say a step are of increasing width in the direction of motion of the web, until they finally merge into each other at the end of the mantle.

Furthermore, the pressure with which the mantle is pressed against the cylinder may be different at every place in accordance with the requirements of the process of creping at a time be carried out. For instance, there may be used a greater number of springs arranged independently from each other about distances *h*, *i* and *k*, as indicated in Fig. 1, which springs may be tensioned at every place as desired. Preferably, the mantle is pressed against the web with a greater pressure at the margins of the latter than at the middle parts which have not yet been subjected to the process of creping. By properly adjusting this pressure it will be possible to reduce to a minimum the amount of power required for the rotation of the cylinder for every desired fineness of the crepe creases at a time to be produced on the web.

It will thus be evident that, when using a fixed and tapering mantle, the conditions warranting a proper and sufficiently uniform longitudinal creping may be fulfilled much more easily than when using a rotating ribbon. This advantage, it is true, may be attained at the expense of a somewhat greater power for the operation of the apparatus, as the motion of the web relatively to the mantle in order to overcome the sliding friction against the latter takes place as a whole along a greater path than with a rotating ribbon, in which latter case this motion corresponds only to the length of the creping. The requirement of greater power, however, can be efficiently compensated by selecting a proper material for the mantle, especially one that results in greater smoothness of its surface and therewith in reduced friction between the mantle and the web.

The use of a fixed tapering mantle for pressing the web to be creped against the rotating cylinder is further connected with the considerable advantage of improving the construction by making the creping tools representing the lateral closure of the space available for the web of a very small height with a view of avoiding any tilting forces acting onto said tools. In this manner it is no more necessary to pass the creping tools from the inside through the grate of the cylinder. Accordingly, the creping tools can be made of a shape independent from the height of the bars of said grate, this height being quite considerable in view of the bending forces acting thereon, especially in case of a web of great width. In view of this it will furthermore be possible to more easily attend to the creping tools which slidingly reciprocate on the outside of the cylinder.

In the further figures of the drawings I have diagrammatically represented an example of an apparatus constructed according to the principles of my present invention and, in addition, some details of the construction.

Fig. 1 is an explanatory diagrammatic section of the aforementioned procedure, Fig. 2 a longitudinal section through the apparatus, Fig. 3 a partial transverse section thereof, Fig. 4 shows the tapering surface of the mantle developed out in a plane and the path of motion of the creping tools, Fig. 5 is a transverse section through an example of a construction of the creping tools and of the guide means therefor, as well as of the part of the rotating cylinder appertaining thereto, Fig. 6 a longitudinal section through the construction according to Fig. 5, Fig. 7 a plan-view of an example of a construction of a plurality of successive creping tools with parts of the guide means and the cylinder appertaining thereto, Fig. 8 a plan-view of the place of exit of the web subsequent to the operation of creping, Fig. 9 a longitudinal section through a special construction of the apparatus at the place of entrance of the web, Fig. 10 a plan-view on Fig. 9 taken in direction of the web entering the apparatus and Fig. 11 a longitudinal section through a special construction of the apparatus at the place of entrance of the web.

In all figures of the drawing, including Fig. 1 which had been explained in the foregoing, like reference characters indicate like parts of the apparatus.

In Fig. 2, *a* represents the rotating cylinder which is shown partly in a side-view and partly in a longitudinal section, said cylinder being provided with grooves *b* on its periphery. The creping tools *d*, which are described more fully further below, are mounted to reciprocate within said grooves in lateral direction and participate in the rotation of the cylinder due to the engagement of said tools with said grooves. The mantle *e* is fixed and does not participate in the rotation of the cylinder, so that the web entering and leaving the apparatus at *l* and *m*, respectively, will be drawn through the apparatus between the cylinder *a* and the mantle *e*. In the present case rubber pads *n* are distributed over the periphery of the mantle and adjusting screws o serve for resiliently pressing said rubber pads against the several places of the mantle at a proper pressure necessary for every place of the latter. However, the pressure with which the mantle *e* is pressed against the cylinder may be produced also by any other means, for instance by imparting a tension in tangential direction to the mantle or by hydraulic means or by a weight or the like.

In Fig. 3 the cylinder *a* provided with grooves *b* over its periphery, is again shown partly in section and partly in view. The lateral walls *p* of the cylinder are mounted on the shaft *q* which is rotated in the direction indicated by arrow. Fixed guides *r* extend from either side over the cylinder *a*, said guides serving to properly guide the rotating creping tools *d* in lateral direction, in such a manner that the web will be shoved together. The guides *r* are preferably fixed to both bearing shields *s* of the apparatus. In Fig. 3 the fixed tapering mantle *e* as well as the guide means *l*, *m* for the web are supposed to be taken away for the sake of clearness.

In Fig. 4 the surface of the mantle *e* is shown as being developed out in a plane. This surface in the most simple case is of the form of a trapezium bounded by straight lines. The surface of the mantle, however, may also be bounded by curved instead of straight lines. Said surface, moreover, is positioned within the space between the two guides *r*. The creping tools *d* which are indicated diagrammatically in this figure, move alongside the longitudinal edges of the surface of the mantle *e* as far as to a point at which they are in closest proximity to each other, whereupon said tools again return into their outermost initial position. During the process of creping said tools form a lateral closure of the space available for the motion of the web. The latter may be of any desired width, while the longitudinal creping will begin at the place where the two edges of the web intersect the path of motion of the creping tools. The web leaves the apparatus at the point at which the mantle *e* ceases to be in contact with the rotating cylinder

Figs. 5 and 6 which are co-ordinated sections in transverse and longitudinal direction, respectively, show a simple form of construction of the creping tools *d*. According to these figures the creping tools consist of a toothed plate d_1 with a pivot d_2 attached thereto and a roller d_3 carried by said pivot. The roller d_3 moves between the rails r_1 and r_2 which form part of the guides *r*. Said two rails r_1 and r_2 are mounted parallelly to and at a distance from each other, this distance being equal to the diameters of said roller d_3. The teeth of said plate d_1 do not need to exactly correspond to the profile of the grooves *b* on the periphery of the cylinder *a*, it being sufficient if said teeth engage with said grooves only as far as to a certain depth of the latter.

As may be seen from Fig. 4, the web *c* to be creped will be subjected to the operation of crep-

ing only along the converging part but not along the diverging part of said guides *r* nor at the two reversing points. The creping tools, accordingly, may be constructed in such a manner that they will closely adjoin each other to form a continuous oblique line along which an uninterrupted shoving action may be exerted onto the web to be creped. This is represented in Fig. 7 in which *a* designates the grooved rotating cylinder, *r* the guide with its two rails r_1 and r_2, *e* the fixed tapering mantle and d_1, d_2 and d_3 the several parts of the creping tools.

As stated above, the web to be creped may be of any desired width, when entering the apparatus, see Fig. 4.

At the place of exit the conditions are different and care should be taken that the width of the web at this place must correspond to the width of the web in upset condition, that is to the width which the web assumes in accordance with the fineness of the creping, the width of the web at the place of entrance and the thickness of the web. Fig. 8 shows how these conditions may be met with by my invention in a very simple manner. The converging and again diverging creping tools are shown at *d*, the fixed tapering mantle at *e* and the web at its point of exit at *c*. The place at which the creping tools are nearest to each other is at A—B. For the reasons stated in connection with the description given for Fig. 7, the creped web is preferably discharged from the apparatus at some earlier time, that is about at the line C—D. If the end of the mantle *e* is constructed in the form of a movable tongue which may be more or less lifted, the line C—D may be displaced as desired to a narrower or wider place, so that the web may be discharged from the creping apparatus just at that point where it is in sufficiently creped condition but not yet under excessive pressure.

Experience has shown that the web underneath the fixed mantle, even if the web had previously been creped in transverse direction and contains a certain amount of moisture, may enter the apparatus without any difficulty and will be properly carried with the rotating cylinder. However, for the sake of safety it is preferable to slightly press the entering web against the grooved cylinder, as had been indicated in Fig. 2 by the fact that the guide roller *l* for the web is in contact with the surface of the cylinder *a*. A form of construction which is still more perfect, as far as positive motion is concerned, is shown in Figs. 9 and 10. As shown in these Figures, alternately shorter and longer ribbons t_1 and t_2 are wound around the guide roller *l* for the web, the longer ribbons serving to firmly press the entering web for some distance against the rotating cylinder *a*, this distance extending from the roller *l* as far as to the narrower rollers *u*. These latter rollers *u* are positioned within the recessed portions of the fixed mantle *e*, the tongues *v* between these recessed portions being, for instance, fixed to a common rod *w* mounted in transverse direction. This arrangement permits to press the web by means of the ribbon t_2 and the roller *u* against the cylinder *a*, until the web has arrived underneath the tongues *v*.

The web c entering the apparatus may furthermore be pressed into the grooves of the cylinder *a* by means of a toothed roller *y*, as shown in Fig. 11. In this way there may be effected a so-called double creping consisting of combined transverse and longitudinal corrugations producing a web which is extensible in both directions. In order to facilitate the pressing of the web into the grooves of the cylinder *a* without exerting an excessive pull, it is only necessary to introduce the web into the apparatus by means of a suitable device, for instance the guide roller *z*, at such a velocity that an excessive length of the web necessary for the transverse creping will always be available between this roller and the cylinder.

RUDOLF HAAS.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. HAAS

APPARATUS FOR THE LONGITUDINAL CREPING OF WEBS OF PAPER OR OTHER SHEET MATERIAL

Filed Dec. 31, 1940

Serial No. 372,674

3 Sheets-Sheet 1

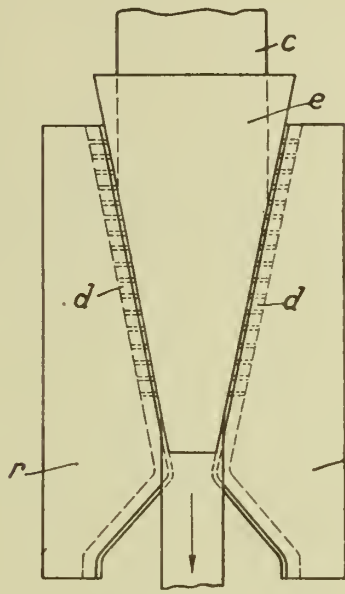


Fig. 4

Fig. 5

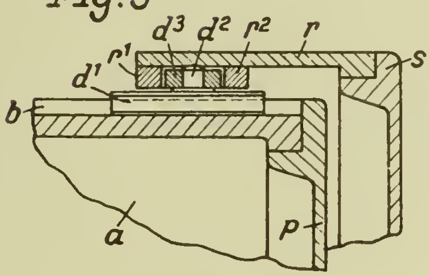


Fig. 6

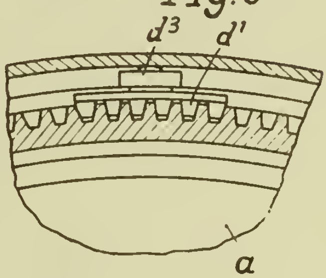
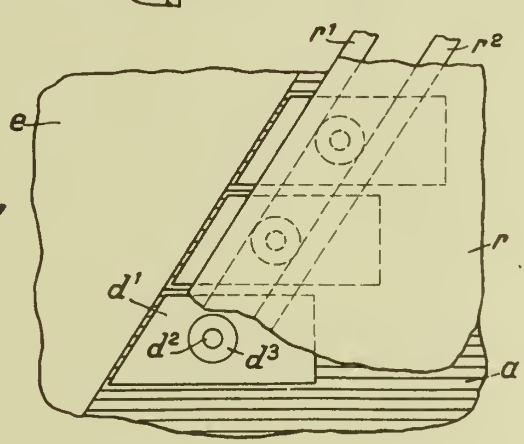


Fig. 7



Inventor:
RUDOLF HAAS,

BY Bailey & Larson

ATTORNEYS

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. HAAS

APPARATUS FOR THE LONGITUDINAL CREPING OF WEBS OF PAPER OR OTHER SHEET MATERIAL

Filed Dec. 31, 1940

Serial No. 372,674

3 Sheets-Sheet 2

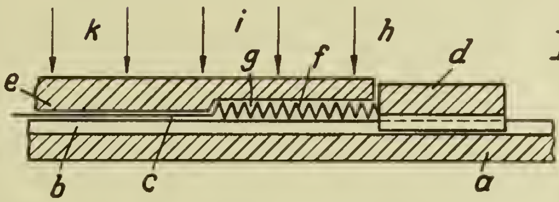


Fig.1

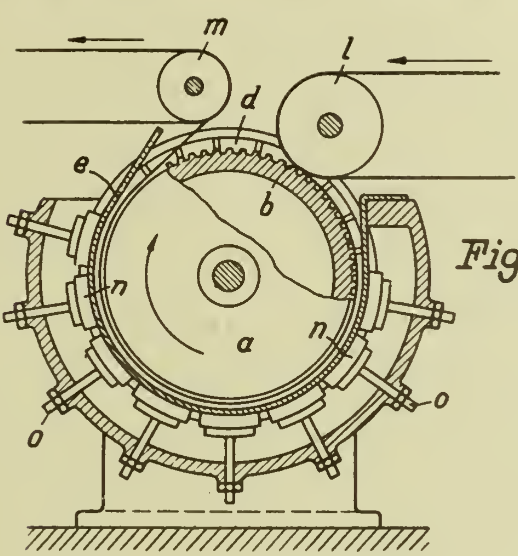


Fig.2

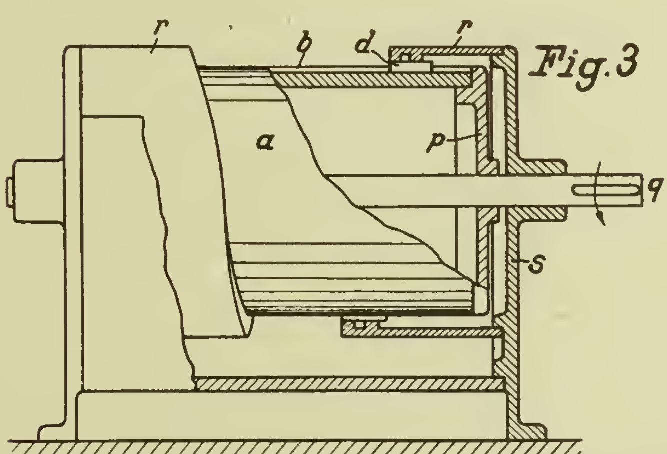


Fig.3

Inventor:
RUDOLF HAAS,

BY Bailey & Larson
ATTORNEYS

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. HAAS

APPARATUS FOR THE LONGITUDINAL CREPING OF WEBS OF PAPER OR OTHER SHEET MATERIAL

Filed Dec. 31, 1940

Serial No. 372,674

3 Sheets-Sheet 3

Fig. 8

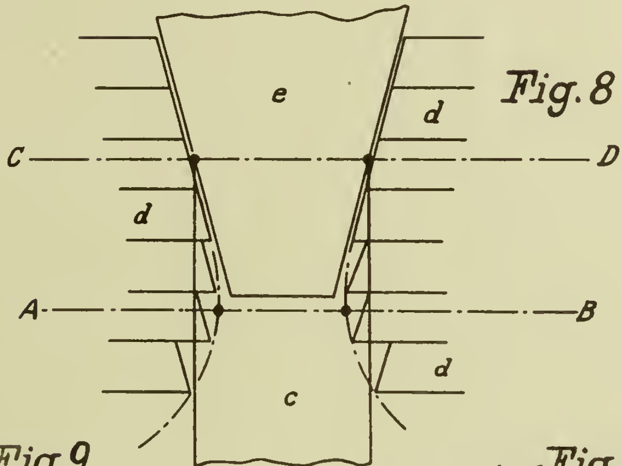


Fig. 9

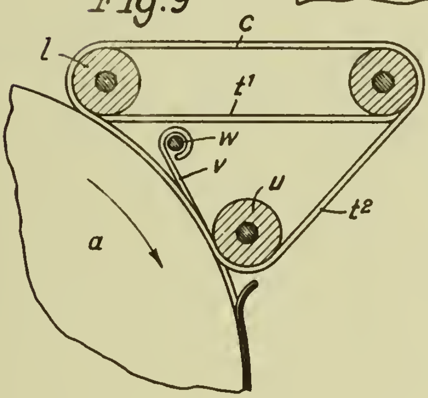


Fig. 10

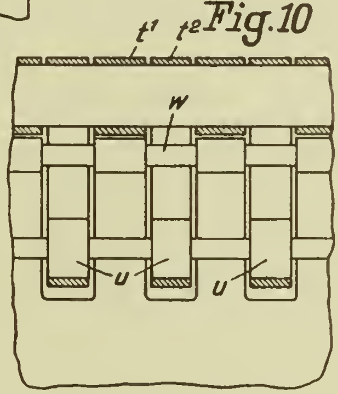
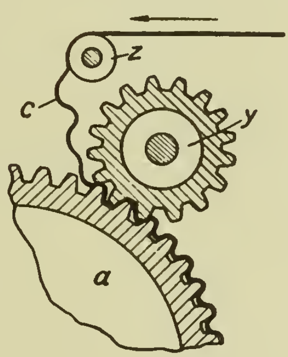


Fig. 11



Inventor:
RUDOLF HAAS,

BY Bailey & Larson

ATTORNEYS

Published May 11, 1943 Serial No. 373,037

ALIEN PROPERTY CUSTODIAN

TREATMENT OF TEXTILE MATERIAL

Fritz Drechsel, Kufstein/Tyrol, Germany; vested in the Alien Property Custodian

No Drawing. Application filed January 3, 1941

This invention contemplates a method for treating textile material with a cuprammonium cellulose solution. More particularly the invention refers to a method of incorporating cellulose to fibrous material and aims at a permanent loading of the material, or a sizing insofar as warp threads are concerned, or a better grip insofar as fabrics are concerned. The solution used in the process is a so-called saturated solution that is a solution which is saturated with cellulose and is practically free from an excess of copper oxide ammonia. Therefor it has practically no etching effect on cellulose.

In using cellulose solutions of this kind, it is a characteristic feature of my invention that the original textile material to be treated is the same as the loading or sizing or finishing substance, namely cellulose, since I found that a permanent effect cannot be secured but by homogeneousness; therefor the fibrous material to be treated must be cellulose, either in the natural form or in a regenerated form (artificial threads or fibres obtained by the viscose or cuprammonium-process).

Hitherto the textile material has been impregnated with a cuprammonium cellulose solution and then treated with suitable means to precipitate and decopperise the cellulose previously dissolved within the impregnating solution.

This after-treatment was hitherto performed by a plurality of steps, the first of which consisted in the use of an alkaline bath for instance soda lye to coagulate the cellulose, while in the final step the copper in the coagulated cellulose was dissolved by suitable acid solutions for instance diluted sulphuric acid.

Another method of after-treatment consisted in precipitating the cellulose and decopperising same by a single treatment for instance with diluted acid.

According to my invention the textile material is impregnated with a cuprammonium cellulose solution and then, preferably after the excess of the impregnating solution has been removed, treated with suitable means to evaporate the ammonia. There results a precipitation of cellulose in and on the fibrous material which still contains the copper in the form of hydroxide, but is substantially free from ammonia. The textile material is then treated with a solution of acid reaction to decopperise the precipitate. After a neutralisation the textile material is washed and dried.

The evaporation of the ammonia can be performed in different ways. Suction can be used with advantage. I prefer, however, the method of evaporating the ammonia by heat. The impregnated material is either guided along a heated surface for instance a heated rotated drum, or it is brought into contact with a hot gaseous means, for instance heated air which may be stagnant or moved preferably in countercurrent to the direction of movement of the textile material. Temperatures up to about 105° C. are useful, while higher temperatures may cause a modification of the precipitated copper which is difficulty soluble in the decopperising liquids.

A kind of hot gaseous means is steam which acts as heat source and carries away the evaporated ammonia.

A plurality of these means amy be used in combination.

Together with the ammonia the water of the cellulose solution may be evaporated either in part or totally.

The dry or wet gaseous ammonia which is removed from the textile material may be collected either by increased pressure or by suitable washing liquids for instance water or sulphuric acid, or by adsorbents for instance activated carbon. The ammonia can easily be reused as condensate or aqueous solution, or by heating the adsorbate, or, in the case of acids as washing liquids, by decomposing the formed ammonia salt by suitable substances for instanec caustic alkali or alkaline earths.

After the ammonia has been removed from the textile material, the decopperising step takes place. Inorganic or organic acids or acid salts of low concentration can be used, for instance sulphuric, hydrochloric, formic or acetic acid. Since the textile material is practically free from ammonia, aqueous solutions from 1 to 2 percent of acid are sufficient to dissolve the copper. After exhaustion the decopperising liquid may be treated to recover the copper. The dilute liquid may be concentrated preferably after neutralisation, and a copper salt is obtained by crystallization. Further methods consist in recovering the copper in metallic form either by electrolysis or by cementation (addition of metallic iron).

The preferred method, however, consists in adding alkaline substances for instance caustic or carbonic alkali or both in a sufficient amount to precipitate the copper as basic salt or hydroxide, which readily can be reused for the preparation of a new bulk of cellulose solution.

The textile material freed from copper is neutralised, washed and finally dried.

The effect is, in the case of fabrics, a better grip, in the case of yarns a perfect size, and par-

ticularly in the case of fibre flocks a considerable increase in weight which amounts up to 14 percent.

According to the invention a perfect and separate recovery of the chemical substances used in the process is secured. The ammonia can be recovered without losses and in a form which can readily be reused, and the decopperising liquid remains free from ammonia. The copper can easily be regained from the decopperising liquid as basic salt or hydroxide which are suitable for the preparation of the cellulose solution. A further advantage consists in that the decopperising liquid can be weaker than before since the textile material to be decopperised is substantially free from ammonia, which otherwise consumes a part of the acid. This is a distinct advantage particularly in the case of a continuous process of sizing warp threads or finishing fabrics since the decopperising liquid remains efficacious for a longer period.

The cuprammonium cellulose solution is, as previously mentioned, a saturated one, and is preferably of low viscosity, approximately like machine oil. This viscosity can be obtained by an additional amount of ammonia in comparison to that amount which is commonly used in spinning solutions. Further methods for decreasing the viscosity consist in reducing the cellulose concentration to about 2 to 6 percent, calculated to air-dry cellulose, or by avoiding addition of neutral salts to the solution or formation of same in the solution, or by employing a plurality or all of these means.

In applying the cellulose solution to the textile material it is advisable to remove the excess solution from the impregnated material by mechanical means for instance soaking, centrifuging, squeezing or the like. This treatment is of particular importance in the case of flocks which should not stick together after the treatment.

The removal of the copper must not necessarily be carried out in the same form of textile material which previously had been impregnated with the solution.

In certain cases it may be advantageous to carry out a textile operation with the impregnated textile material after the same has been freed from ammonia and dried but before the removal of the copper, and to decopperise the material after that textile operation. Thus, for instance, dry copper-containing blue threads may be woven to a fabric which is afterwards decopperised. The blue copper-containing threads are particularly suitable for textile operations, and can be stored as long as desired. Their elasticity is excellent.

Example 1

A suitable vessel provided with stirring or kneading arms is filled with cotton flock and with an easily fluid copperoxide ammonia solution having a content of about 3% cellulose. The amount of the solution is about twenty times much as the weight of the fibre. The content of the vessel is thoroughly agitated during half an hour. The content of the vessel is then centrifuged to remove the excess of the solution, and afterwards treated with steam until the ammonia is substantially evaporated. Instead of this treatment, the fibrous mass after being freed from the excess of the cellulose solution is brought in another closed vessel and subjected therein to suction.

The blue fibrous mass is then decopperised by sulphuric acid of a concentration of 1 to 2 percent, neutralised, washed and finally dried; the flock is now ready for use in the carding-process.

When flocks of artificial fibres consisting of regenerated cellulose are treated in the same manner, the fibres get rid of their limp touch, furthermore their spinning qualities are considerably improved.

Example 2

A large number of warp threads consisting of natural or of regenerated cellulose or of both are drawn off from a warp beam or a number of such beams and impregnated or coated by a cuprammonium cellulose solution, preferably of somewhat higher viscosity than that according to Example 1. The excess of the solution is removed by a wiper or scraper made of rubber; the threads travel along to a heat source for instance around a steamheated rotatable drum or through a chamber which may be provided with heating elements or through which passes a heated gas or air. The threads freed from ammonia are then guided through a bath consisting of dilute sulphuric acid of three percent, squeezed, neutralised, washed and finally dried on a heated drum or in another drying chamber of the same kind as mentioned before. Finally, the dried threads are wound on a warp beam. The process is carried out continuously.

According to a modification of this method the action of the heat on the freshly impregnated threads is continued until they are dry, and the blue threads are immediately wound on the warp beam. The decopperisation takes place in the woven fabric.

Example 3

A fabric made from cotton yarn or from artificial fibres of regenerated cellulose or from both is treated in a similar manner as the warp threads according to Example 2. The effect of the treatment consists in a better appearance and a better grip.

Instead of evaporating the ammonia by heat, steam may be employed in a closed chamber to evaporate the ammonia and carry it away to a receptacle in which aqueous ammonia is condensed either by cold or by pressure or by both.

FRITZ DRECHS[illegible]

P blished May 11, 1943

Serial No. 371,803

ALIEN PROPERTY CUSTODIAN

CYLINDRICAL ROTARY SLIDE VALVE

Christian Wilhelm Paul Heylandt and Rudolf Mewes, Berlin-Britz, Germany; vested in the Alien Property Custodian

Application filed December 26, 1940

The present invention relates to a cylindrical rotary slide valve for the valve gear of steam engines, compressors, expansion engines, and internal combustion engines.

The familiar types of cylindrical rotary slide valves are either fitted into a borehole in the cylinder cover or the cylinder block, or are pressed yieldingly on the cylinder head by means of a movable cylinder cover. The former method is the cause of a great deal of trouble in operation, because it is impossible to secure a fit that will be equally tight whether the cylinder is hot or cold. By the latter method the cylinder cover is subjected to a pressure approximately equal to that exerted on the piston, so that a considerable surface load is exerted on a rotary slide valve designed as a plain friction bearing.

The aim of the present invention is to avoid the drawbacks inherent in these two designs, while retaining the merits of each.

For that purpose a fixed cylinder cover with a port opening of approximately the same size as that of the valve gear section absorbs about 60 to 80 per cent of the gas pressure, while a slipper is pressed on the rotary roller by means of a spring with a sealing pressure of about 2 to 5 kg/cm^2 and determines the timing of the valve gear by means of the slot therein. The fixed cylinder cover and the movable slipper are protected against passage of the medium working in the cylinder, which may be steam, or compressed air, or combustion gases, by means of a presealing device which consists of a piston ring or a packing, and a soft or elastic main sealing device, for example, a material which should be soft or as tough as possible, such as deep drawing sheet steel, special deep-drawing sheet steel, soft brass, soft bronze, aluminum, asbestos-metal fabric, or the like. The result is twofold: firstly, only a small fraction of the gas pressure is transmitted to the slide valve roller, just as is the case when the slide valve is fitted into a borehole, and secondly, sealing is effected both in the cold and in the hot state by means of the pressure exerted by the spring on the slipper, as occurs when a rotary slide valve is fitted with a movable cylinder cover.

The following three examples are intended to illustrate the nature of this invention and the way in which it may be carried into practical effect, but the invention is not confined to these examples.

Fig. 1 shows the cylinder head 2 on the cylinder block 1. The valve gear roller 3 rotates in the said cylinder head 2 and is provided with the necessary port openings, one of which, the passage 4, can be seen in the figure. The slipper 6, which has the valve gear section 7, is pressed by means of the spring 5 on the said roller 3, whereby it is constantly in touch both with the said slipper as well as with the cylinder head. The fixed cylinder cover 8 is pressed gas-tight by means of the head on the cylinder block, for which purpose the familiar type of cylinder head packings may be used. A pre-sealing device 9, which consists of a packing or a ring of graphite, carbon, or metal, is fitted in the said fixed cylinder cover 8. Approximately 75 per cent of the pressure is absorbed by the said pre-sealing device, so that the change of pressure between the said presealing device and the main sealing device amounts to less than 25 per cent of the change of pressure of the working cylinder. The main sealing device 10 is composed of a soft or elastic material and can yield to the corresponding extent when the valve gear roller increases in size as it heats up and the slipper moves towards the cylinder cover. The characteristic of the said spring 5 is of such a nature that the pressure exerted is barely measurable in view of the short distance traversed by the spring.

According to the design illustrated in Fig. 2, the fixed cylinder cover is united with the cylinder block. The various parts are numbered in the same way as in Fig. 1.

According to the design shown in Fig. 3, the fixed cylinder cover is united with the cylinder head which consists of the two parts 2 and 2′ for convenience of assembly. The main sealing device 10 of this design is pressed by means of a nut 8′ on the part of the cylinder head that forms the fixed cylinder cover and by means of the nut 6′ on the movable slipper. The other parts are numbered to correspond with Fig. 1.

CHRISTIAN WILHELM PAUL HEYLANDT.
RUDOLF MEWES.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

C. W. P. HEYLANDT ET AL
CYLINDRICAL ROTARY SLIDE VALVE
Filed Dec. 26, 1940

Serial No.
371,803

Fig. 1.

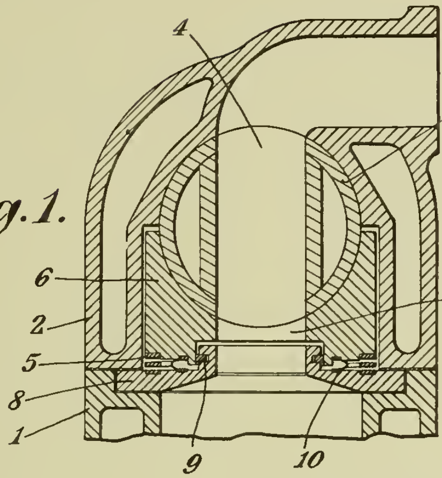


Fig. 2.

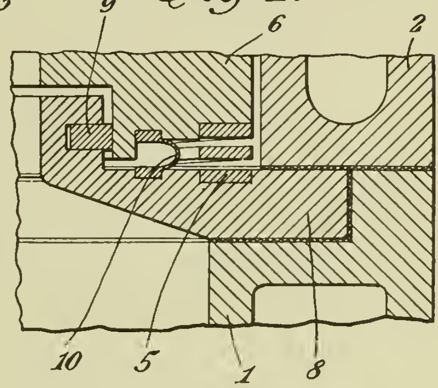


Fig. 3.

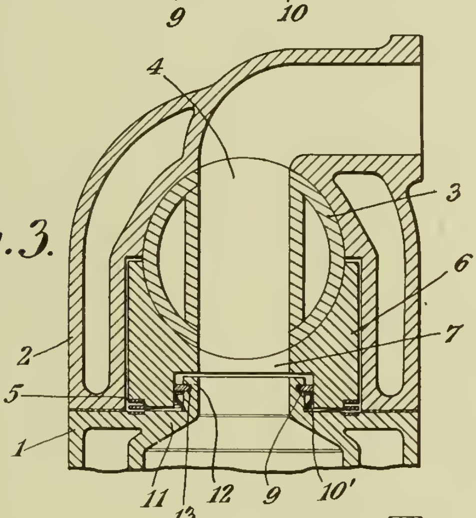


Fig. 4.

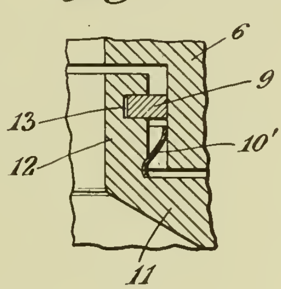


Fig. 5.

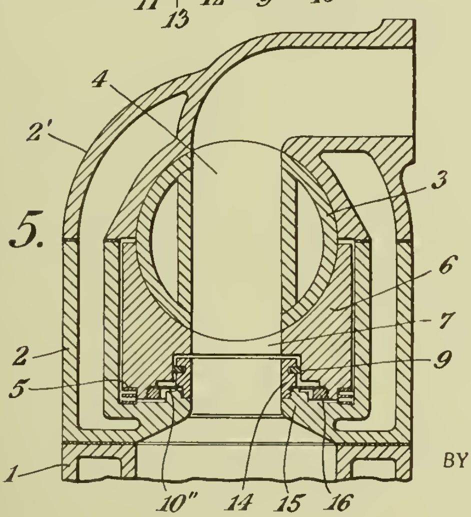
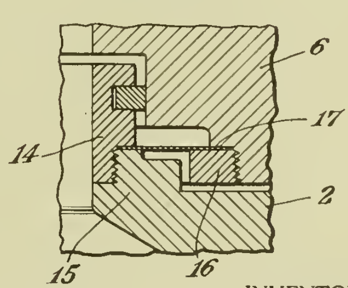


Fig. 6.



INVENTORS
Christian Wilhelm Paul Heylandt
Rudolf Mewes
BY
Paul H. Klein
their Attorney.

Published May 11, 1943 Serial No. 373,185

ALIEN PROPERTY CUSTODIAN

CARBOHYDRATE SOLUTIONS

Bruno Wendt, Dessau, Germany; vested in the Alien Property Custodian

No Drawing. Application filed January 4, 1941

My present invention relates to carbohydrate solutions and more particularly to the change in viscosity of such solutions.

It is an object of my invention to provide a process for increasing the viscosity of aqueous carbohydrate solutions.

Another object is the provision of a process for increasing the viscosity of organic carbohydrate solutions containing water.

Further objects of my invention will become apparent from the following description.

I have found that the viscosity of solutions containing carbohydrates or derivatives thereof such as glucose, dextrine, starch (arrow root), or derivatives of cellulose can be increased by adding compounds having a substantive character. It is noted that solutions containing only these compounds in amounts as used according to the invention do not possess a perceptible viscosity compared with the increase of viscosity which they effect.

The change in viscosity does not depend only on the nature of the added substance but on that of the substratum. It has been found that the viscosity of substances which are very viscous is effected more appreciably than the viscosity of compounds which yield weakly viscous solutions as, for instance, sugar and dextrine. If, however, concentrated solutions of the latter compounds are used the reached increase of viscosity can already be distinguished with the naked eye. Solutions of high-viscous derivatives of cellulose such as methylcellulose or hydroxyalkylcellulose can even be converted into solid jellies by adding substantive substances.

Attempts have shown that the efficiency of the added substances is decreased if electrolytes are present. It is therefore advantageous to use solutions containing at most a small amount of electrolytes.

All known substantive compounds can be used in the process of the present invention. Colorless or nearly colorless compounds are especially valuable. Aqueous solutions containing medium-viscous or high-viscous methylcelluloses or hydroxy-alkylcelluloses are preferably suitable for testing a compound for efficiency in the sense of my present process, as they are intensely affected by substantive compounds.

The following substantive compounds are especially suitable:

o-Hydroxy-carboxylic acid amides as, for instance, hydroxynaphthoic acid alkylamides and hydroxynaphthoic acid arylamides such as 2,3-hydroxynaphthoic acid diphenylamide, 6-ethoxy-2,3-hydroxy-naphthoic acid-p-nitrophenylamide, bis-(2,3-hydroxynaphthoyl)-p-phenylenediamine, bis-(2,3-hydroxynaphthoyl)-dianisidine, bis-(2,3-hydroxynaphthoyl)-diaminostilbene, bis-(1,2-hydroxynaphthoyl)-benzidine, arylides of 7-hydroxynaphthalene-1-carboxylic acid, furthermore derivatives of salicyclic acid such as arylides of 2-hydroxydiphenyl-3-carboxylic acid, 5-phenyl-salicoyl-acetone, amides of 2-hydroxy-anthracene-3-carboxylic acid, hydroxycarbazole carboxylic acids, hydroxy-naphthocarbazole carboxylic acids and hydrogenated products thereof, diphenyleneoxide hydroxycarboxylic acids, diphenylene-sulfide hydroxycarboxylic acids, 3-hydroxydiphenyl-aminocarboxylic acid, hydroxychrysene carboxylic acid, hydroxyfluorene carboxylic acid, hydroxyphenanthrene carboxylic acid and hydroxynaphthazone, hydroxytriazoles and similar heterocyclic compounds.

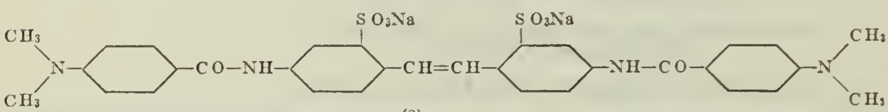
Moreover, colorless compounds are valuable which contain especial groups capable of rendering the compound substantive. Such groups are often described as constituents of azo dyestuffs (confer, for instance, "Kolloidchemische Beihefte, vol. 34, p. 218; 1931"). Compounds of this kind are also employed as diazo- or coupling components for forming dyestuff with the fiber as described in many patent specifications. Groups adapted to render substances substantive are, for instance, derived from the following compounds:

Benzidine and derivatives thereof, diaminofluorene, diamino-diphenyleneoxide, diaminodiphenylenesulfide, diamino°carbazole, 1,4- and 1,5-naphthylenediamines, diaminodiphenylamine, diaminostilbene, diaminodiphenylurea, diaminodiphenylthiourea, compounds which contain several groups of aminobenzoyl or several similar groups. Furthermore, substances are suitable which contain the group of aminonaphthol or derivatives thereof as, for instance, 2-amino-5-naphthol-7-sulfo acid, 1-amino-5-naphthol-7-sulfo acid and derivatives thereof, for instance alkyl-, phenyl-, benzoyl-, aminobenzoyl-, amino-benzoyl - aminobenzoyl - compounds and ureas thereof. Moreover, the arylides of acetoacetic acid, cyanacetic acid, oxalacetic acid, acetone-dicarboxylic acid, benzoylacetic acid, terephthalacetic acid, naphthoylacetic acid, hydroxynaphoylacetic acid and similar compounds are substantive. Of the heterocyclic rings which render compounds substantive the following rings are for instance suitable: thiazole, triazole and imidazole rings. Compounds with such rings are, for instance, dehydrothiotoluidine, the sulfo acid thereof and similar compounds, triazoles

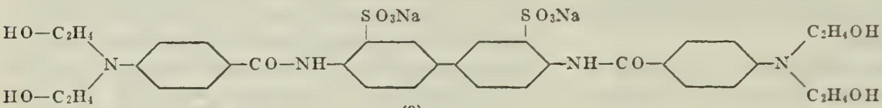
and imidazoles of aminonaphtholsulfo acids and 1,3,5-triazine compounds. These classes of compounds, for instance, include products obtained by reacting 1 mol of benzidine-disulfo acid, diaminostilbenedisulfo acid or diaminodiphenylureadisulfo acid with two mols of cyanurchloride and subsequently saponifying the chlorine atoms. Instead of the saponification a reaction with aniline or other aliphatic, aromatic hydroaromatic or heterocyclic amines or hydroxy compounds may also be carried out, whereupon, if desired, the chlorine not reacted is saponified. The following compounds are especially suitable:

The products prepared by using derivatives of cellulose are especially valuable. Useful derivatives of cellulose are, for instance, methylcelluloses, hydroxyalkylcelluloses, and acetylcelluloses extensively hydrolyzed such as acetylcelluloses soluble in aqueous acetone of 40% strength. Of the colorless or slightly colored substances serving to increase the viscosity those compounds are important which are neither diazotizable nor capable of coupling. The mixtures or solution of the colloids and added substances may be used, for instance, for the preparation of finishing and sizing products. In this case a considerable per-

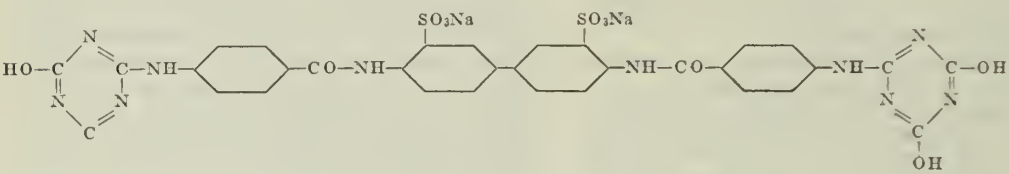
(1)



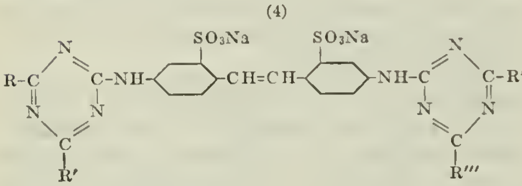
(2)



(3)



(4)



wherein R, R', R'' and R''' represent hydroxyl or a monovalent organic radical, for instance, of isoamylamine, di-oxethylamine, dodecylamine, cyclohexylamine, aniline, chloroaniline, anisdine, p-cyclohexylaniline, phenol, thiophenol, aminobenzthiazole or aminobenzimidazole.

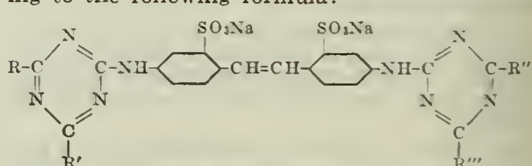
The substantive compound may be mixed with the water before or after the addition to the water of the carbohydrate. In the former instance a very high speed of solution is attained. The substantive compounds may, moreover, be added in the production of the colloid, for instance, during its precipitation or desiccation. Thus products are obtained which from the outset contain substances capable of increasing the viscosity. Similar products may be produced by simply mixing the components with one another or grinding them together in dry condition. The quantity of the compound to be added is dependent on its nature and that of the colloid as well as on the viscosity desired. Favorable effects are reached when the quantity of the substantive compound amounts to 2–25% of the quantity of the colloid. Besides the carbohydrates above mentioned other carbohydrates may also be used, for instance fructose or cane sugar.

centage (75%) of derivative of cellulose is saved so that the costs of preparation are lower than those of the products hitherto employed and having the same viscosity. The substantive compounds may also serve to regulate the viscosity of spinning solutions. Instead of acetone other solvents for derivatives of cellulose may be used, for instance dioxane.

The more detailed practice of the invention is illustrated by the following example. There are of course many forms of the invention other than this specific embodiment.

Example

7.5 grams of medium-viscous tylose are dissolved in 900 cc. of water. To this mixture a solution is added which consists of 100 cc. of water and 1.5 grams of a compound corresponding to the following formula:



wherein R and R'' are the radical of aniline and R' and R''' hydroxyl. A sizing product is thus obtained which is of a property similar to that of a product made in usual manner from 23 grams of tylose and 1000 cc. of water.

BRUNO WENDT.

Published May 11, 1943 Serial No. 373,283

ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING COMPOSITE SHEET MATERIAL

Josef Grabec, Bratislava, Slovakia; vested in the Alien Property Custodian

Application filed January 6, 1941

This invention relates to an elastically distensible composite material which is pervious to air, and which consists of one or more plies of distensible textile fabric such as stockinette and the like, and at least one layer of foraminous elastic material such as rubber or its equivalents.

Composite sheet materials have already become known which consist of a perforated rubber sheet to both sides of which there are applied, by means of layers of adhesives, plies of distensible textile fabric such as stockinette. It has also been proposed to stick together textile material and a rubber sheet and then to perforate the composite sheet material thus formed. This however involves mechanically damaging the textile fabric used and destroying the character of the textile surface. Further, it is known to work up textile-covered rubber threads into fabrics, but the manufacturing of such products is cumbrous and expensive.

The products according to the present invention are distinguishable from known products of a similar nature by the fact that the textile fabric is firmly attached, at least on one side, to a coherent system of press-molded rib-like elements of suitable breadth and height made of elastic material (such as rubber) in which the apertures between these elements are of such size that there are at least one hundred thereof to the square inch. The height and cross-section of the webs of the elastic material are determined by the desired resistance of the finished material to distension; in order to attain the powerful elasticity required for example in orthopaedic corsets and the like it is necessary for the webs to be 1 mm. and more in height. The term "elastic material" as here used is to be understood to mean any material or composition of matter having the property of elasticity and capable of conversion from a deformable into a more or less permanently elastic state. The process serving for this conversion will hereinafter be termed "vulcanization", although it is to be understood that this term is not to be considered as limited in scope to the processes and means now commonly employed in connection with rubber alone.

The breadth of the rib-like webs of the layer of elastic material employed depends in any particular instance on the shape and number of the apertures and/or on the pattern adopted therefor. These webs should, however, be kept as narrow as possible, since wide webs not only detract from the ventilating properties of the composite material according to the invention, but also reduce its suitability for taking stitches when sewn in a sewing machine.

The uncovered surface of the textile fabric used should be as large as possible, and should preferably amount in all to at least 50% of the entire surface.

The webs formed from the elastic material by pressure molding should preferably take the form of a repeat pattern structure, and thus contribute at the same time to the formation of a superficial pattern or texture on the finished product of the invention.

The decorative effect can also be enhanced by making the layer of elastic material of a color different from that of the textile fabric backing.

In order to increase the decorative effect of the system of rib-like webs, the surface of the layer of elastic material furthest removed from the textile fabric can be provided with ornamental devices, impressions, grooves, points, and the like.

If it is desired that both sides of the composite sheet material shall present the appearance of textile fabric, a further ply of textile fabric can be applied to the uncovered side of the layer of elastic material.

To obtain firmer adherence in the case of certain textile fabrics the textile fabric used may be preliminarily treated with a suitable solution of elastic material, care being taken to prevent the holes between the stitches from becoming clogged. The employment of this expedient becomes seldom necessary however.

The manufacturing of the product according to the present invention is preferably carried out by forming the webs from the elastic material used, and uniting the same to the textile fabric in a single working stage.

The material according to the invention is manufactured by compressing together alternate sheets of distensible textile fabric and elastic material (such as rubber) in a deformable state, that is to say at least one of each such sheets, in a preheated molding device the die member of which is suitably profiled to form the desired fine rib-like webs and intervening apertures in the resulting composite sheet material. This operation also serves normally to effect the uniting of the layer of elastic material to the textile fabric ply, and its duration is determined by the requirement of effecting these two purposes, namely the molding of the webs and the satisfactory combining of the layer of elastic material with the textile fabric ply. The vulcanization of the elastic material can be effected either simultaneously

with the molding operation or subsequently thereto.

In order to obtain continuous working, the said molding device is preferably made with the pressing members in the form of rolls. In this case a profiled roll serves as the die, and a counter roll as the platen of the device, and the textile fabric ply and the sheet of elastic material (such as rubber) are passed together between these heated rolls. The speed of rotation of these rolls should be so determined that time is allowed for the formation of the webs, for their attachment to the textile fabric backing, and also if desired for vulcanization, in a single uninterrupted working operation. It will be clear that it is equally possible in accordance with the invention to produce composite sheet material consisting of a layer of elastic material with a covering ply of textile fabric on each side or of say two layers of elastic material with one intervening ply of textile fabric.

Particularly valuable products in accordance with the invention are those consisting of a geometrical system of intersecting rib-like webs of the elastic material used and at least one ply of distensible textile fabric, and in which at least some of the threads of the textile fabric are intermingled with the webs of the elastic material. These new products are distinguishable from others of a similar nature by the fact that the intermingled threads of the textile fabric, or at least a part thereof, become adapted to the shape of or enter into the structure of the webs of elastic material constituting the said geometrical system.

These particularly valuable and distinctive products can be produced in a simple manner in a single working operation by subjecting the sheet of elastic material in a deformable state placed upon or between a ply or plies of distensible textile fabric to a pressure molding operation using pressing implements or dies having pointedly tapered ends for instance of pyramidal or conical shape. It has transpired that the plies of textile fabric are in no way damaged by such implements, and that the threads merely become laterally displaced and rearranged by the tapered entering ends of the die elements. This applies more particularly in the case of the upper ply of textile fabric facing the molding implement or die. In this manner there is obtained in the first place very much improved ventilation, and in the second place there is obtained a novel and distinctive type of surface texture which can no longer be designated as being that of a regular textile body, since in it the threads of the textile fabric and the molded webs of the intermediate layer of elastic material are intimately combined and intermingled. The majority of the threads of the superposed ply of textile fabric thus undergo rearrangement, with the result that a product is obtained which is entirely different in character from that obtained by merely sticking a layer of elastic material on to textile fabric. The textile threads thus become for the greater part embedded in the elastic material, are nevertheless elastic, but on the other hand can no longer become displaced relatively to each other; thus in the described manner there is obtained in a single working operation a gauze-like product in which a distensible textile fabric and elastic material are combined to form a uniform whole. A preferred arrangement is also that in which a layer of elastic material is located between two plies of textile fabric. The under ply of textile fabric which comes in contact with the platen portion of the pressure molding device remains unaffected in appearance or structure and merely becomes attached to the intermediate layer of elastic material. If desired, the pressure molding can also be effected from both sides simultaneously, and in this case a product of altered appearance is obtained; it is also possible to employ more than two plies of textile fabric with an intermediate layer of elastic material between each pair thereof, and to treat the same in the described manner, the pressure molding being effected from one or from both sides. It is particularly advantageous in this connection to employ molding implements of the described nature in the form of rolls, which permit of the production of the new composite material in a simple manner, in a continuous sheet, and in a single working operation, and which permit of effecting vulcanization either simultaneously with or immediately subsequent to the molding process. The number and size of the apertures left between the webs of the elastic material may vary according to the purpose for which the finished composite material is to be used, but the finished material has at least 100 such apertures per square inch.

One of the outstanding technical advantages of the new products according to the present invention over other known products is their admirable suitability for direct sewing.

In the accompanying drawings, which form part of this specification, Figs. 1 to 4 show on an enlarged scale several examples of designs for the system of webs of the elastic material in a product according to the invention composed of a ply of textile fabric and a layer of elastic material, in plan view. Figs. 5 and 6 show on an enlarged scale cross-sections of types of the composite sheet material according to the invention in which the textile threads are partly intermingled with the elastic material. The textile threads are in this case partly "intermolded" more or less indiscriminately in and with the regular webs formed from the elastic material.

In the figures of the drawings, *a* denotes the layer of elastic material formed of intersecting rib-like webs, and *b* the ply of textile fabric, while *b′* denotes points at which textile threads are intermolded with the layer of elastic material. *c* denotes the under or backing layer of textile fabric, and *c′* certain points at which threads pertaining to this ply are intermolded with the webs of the layer of elastic material.

JOSEF GRABEC.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

J. GRABEC
METHOD OF MANUFACTURING COMPOSITE
SHEET MATERIAL
Filed Jan. 6, 1941

Serial No.
373,283

Fig.1

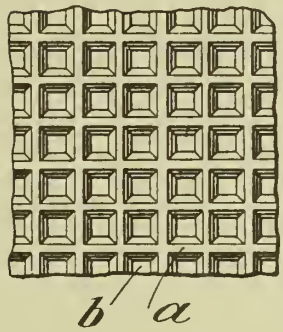


Fig.1a

Fig.2

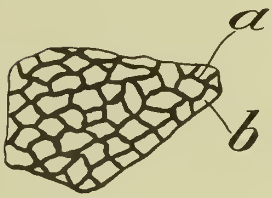


Fig.3

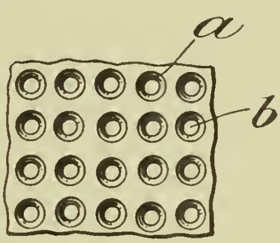


Fig.4

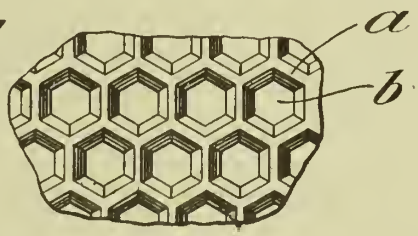


Fig.5

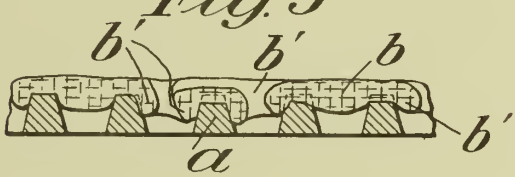


Fig.6

Inventor:
JOSEF GRABEC
By Theodore C. Browne
Attorney.

Published May 11, 1943 Serial No. 373,612

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PREPARATION OF DURABLE AQUEOUS SOLUTIONS PARTICULARLY OF PHARMACEUTICAL NATURE

Jan Kok, Amsterdam, Netherlands; vested in the Alien Property Custodian

No Drawing. Application filed January 8, 1941

It is known that many substances in aqueous solution are highly subject to oxidations; so, for instance, solutions of sodium salicylate are soon reddish coloured, and, when in presence of bicarbonate of sodium, even in some days violet.

Solutions of ascorbic acid, adrenaline, apomorphine, and many other substances are also readily oxidated in aqueous medium; under these circumstances solutions of adrenaline become red coloured, solutions of apomorphine become green coloured. Mixtures of adrenaline and p-aminobenzoyldiethylamino-ethanol become, when stored, yellow. All the oxidations mentioned take already place at common temperature; by heating these oxidations are considerably accelerated.

As further examples of these phenomena of oxidation, which are particularly extremely detrimental for the pharmacy, may be mentioned the following.

Solutions of ferrochloride are, when stored, soon oxidated under forming of basic ferrisalts, which are not only undesired for their etching properties, but also worthless as therapeuticum by secondary anaemia and chlorosis. Also many alcaloides in dissolved state endure similar oxidations (quinine, morphine, emetine). Known is, for instance, the green colouring of a mixture of quinine-hydrochloride and ethylurethane after having been stored for some time.

In literature several means have been indicated to avoid such undesired oxidations. Partly these means are not inconceivable, seen from a medical point of view, such as, for instance, the addition of small quantities of sulphurous acid or potassium metabisulphite, partly they have appeared to be insufficient. The best means known up till now is the addition of small quantities of ascorbic acid. The objection thereof, however, is that the same itself is readily oxidated and looses its protecting working. It is true that it is possible to take measures to avoid this, such as the choice of the right pH and the use of double distilled water; a solution of the above mentioned objections satisfactory in all respects, however, has up till now not been obtained yet.

It has been found now that durable aqueous solutions of more or less oxidable substances can be prepared by taking care for the presence of hydrocyanic acid, resp. of a substance splitting off hydrocyanic acid, or of a mixture of such substances. For this purpose cherry-laurel-water, which is often used in medicine and which can split off 0.1% of HCN, is very suitable. The quantity of these substances required for the protection again oxidations, is so small, that the substances in themselves have not an pharmacological effect and in consequence thereof no objections can be raised against the addition of these substances. With good result also water of bitter almonds may be used.

Further it has appeared, that in many cases it is possible to increase the effect of the protecting working of ascorbic acid by addition of small quantities of a liquid containing HCN.

A further advantage of the present invention is, that the pH of the solutions can be increased and in this way for instance neutral durable solutions can be prepared as injection liquids. It appears that the protecting effect does not only consist in vitro, but also in vivo, so that in this way it is possible to bring substances, such as hormones, ferments, etc. into the organism in enterale way, which substances, would they be applied in this way, would be decomposed before they would have reached their place of action.

At hand of some examples the invention may be further explained.

Example I

1 cm^3 Aqua Laurocerasi Ph. Necrl. V. cherry-laurel-water is additioned to a solution containing 50 g. quininehydrochloride and 25 g. ethylurethane pro 100 cm^3. The liquid is brought into ampullae and after that sterilized in the usual way. While it appears, that without addition of cherry-laurel-water, such a liquid, brought into ampullae, has a green colour, after having been stored for a month, which colour is gradually darkening, the injection liquid, obtained according to the invention, was even after one year still entirely colourless.

Example II

A solution of 20% of potassium salicylate, to which solution 1% of cherry-laurel-water is additioned, is heated at 100° C. for one hour in a closed vessel. After three months the liquid is still entirely colourless, while a solution, prepared at the same time, but without addition of cherry-laurel-water and also heated at 100° C. for one hour, is clearly red coloured after the said time.

Example III

It is possible to protect solutions of apomorphine against oxidation by addition of 2 mg of ascorbic acid pro cm^3, if the usual precautions are taken. However, is one vol % of cherry-laurel-water additioned, then it is possible to sterilize the solution at 100° C. without obtaining a green coloured solution. It has appeared that the solution prepared in this way, is pharmacologically as much active as a freshly prepared and non-sterilized solution.

JAN KOK.

Published May 11, 1943 Serial No. 373,697

ALIEN PROPERTY CUSTODIAN

METHOD FOR THE MANUFACTURE OF HIGH GRADE METAL BARS, RODS OR THE LIKE

Rudolf Schmidt, Vienna X, Austria; vested in the Alien Property Custodian

No Drawing. Application filed January 8, 1941

This invention relates to a method of producing high grade twisted metal rods, bars and the like (particularly for concrete reinforcing inserts) which have uniform strength properties throughout, the material being automatically tested by the process of production, i. e. a test for the material being combined therewith. Defects in the material of such rods or the like become so clearly apparent during the process of manufacture that the rods or the like may be easily sorted out.

The method according to the invention consists in that rods, bars, wires and the like of any desired section, while being twisted in the cold in known manner are subjected to an axial tensile force not exceeding the tensile yield point of the material, so that no stretching of the entire cross-section of the material occurs.

It is known to twist in the cold square section rods with the aid of clamping heads maintained a fixed clamping distance apart. If such square section rods are twisted with the aid of clamping heads which are freely movable in their longitudinal direction, they become shorter. But if during the twisting the clamping distance remains constant, shortening becomes impossible, therefore the tensile yield point is exceeded during the twisting, i. e. the material is stretched.

It has also been proposed to provide a method according to which rods are twisted axially or are intertwisted and are simultaneously stretched. During the twisting the clamping distance is maintained constant to ensure contact throughout between the intertwisted rods.

Since in the intertwisting of two or more rods shortening tends to occur, the material is stretched by keeping the clamping distance constant, i. e. is subjected to stresses beyond the tensile yield point, as in the case of the square section rods. If now, in addition, the clamping heads are moved apart during the twisting, the material is additionally stretched. The tensile forces which arise during the twisting by the longitudinal movement of the clamping heads are accordingly so great that the material is subjected to stresses above the tensile yield point, i. e. is stretched. Similar phenomena arise in the case of single rods twisted in a similar manner.

As is known, rods are twisted per se or are intertwisted in the cold to increase the strength of the rod material. But if during twisting an additional tensile force in excess of the yield point is simultaneously exerted, i. e. additional stretching is applied, the strength properties are not improved further; on the contrary, they deteriorate. When rods which become shorter during twisting, such as for example square section rods, or a plurality of intertwisted rods, are twisted with constant clamping distance, the magnitude of the tensile force thereby applied to the rods and therewith the stretching depend upon the degree of twisting. The magnitude of the tensile force exerted upon the rod cannot therefore be selected at will, stretching will occur in any case, and the magnitude thereof will depend upon the degree of twisting.

As compared to this, the essential advantage of the present invention consists in that the degree of twisting and the tensile force exerted upon the rod during twisting may be selected independently of one another and values may be adopted which are the most convenient for the material and size in question. Thus rods, which are shortened during twisting, may be twisted under a tensile force which is below the tensile yield point, in such a way that additional stretching of the material, i. e. a deterioration of the strength properties consequent thereon, may be avoided. As the case may be, the axial tensile force may be maintained constant or varied during the twisting process.

RUDOLF SCHMIDT.

Published May 11, 1943 Serial No. 373,778

ALIEN PROPERTY CUSTODIAN

TWISTING REINFORCEMENTS FOR CONCRETE

Rudolf Schmidt, Vienna, Austria; vested in the Alien Property Custodian

Application filed January 8, 1941

It is known that the strength of rolled iron may be very considerably increased by twisting in the cold state. The present invention makes use of this fact for the manufacture of metal reinforcements for concrete, in such manner that a substantially round section bar, having continuous or interrupted ribs or projections, is subjected to twisting in the cold state, with the result that the profile obtained has increased bonding capacity and also a very considerably increased elastic limit without harmful effects arising and without the modulus of elasticity being modified.

Such a result cannot be obtained with square or triangular section bars, since if these are employed in cold twisted condition, cracking effects in the concrete arise, apart from the tendency of crack formation at the edges of the bars.

An embodiment comprising a substantially round section bar with two diametrally opposite ribs is preferable. In this connection it is to be noted that there is no advantage in practice in increasing the number of ribs beyond two, which in rolling and in the application of reinforcement for concrete appear to be most favorable.

According to the invention the twisting in the cold state, cross-sectional swelling being preferably avoided, is carried to an extent at which the desired elastic limit is attained, the convolutions being made as flat as possible because the flatter they are the greater the bonding capacity. Examination of the structure enables one to ascertain if the bars have been twisted in the cold or the warm state. If the latter, then only the bonding capacity is increased; but increase in the bonding capacity, accompanied by little or no increase of the elastic limit, has no practical advantages. Only by also increasing the elastic limit is any practical advantage obtained.

Experiments have yielded the following data:

Pitch	σF kg./mm.^{2}	σB kg./mm.^{2}	Increase per cent	
			σF	σB
∞	29	43	----------	----------
15	42	50	45	16
10	46	53	59	23
5	55	61	89	42

Thus, reinforcing material made according to the invention has properties which have not been achieved hitherto by any known process. It affords the possibility of achieving a considerable saving in weight and costs in a reinforced concrete construction without reducing its carrying capacity and in spite of the use of the cheapest reinforcing material.

Substantially round bars with ribs as aforesaid made of metals other than iron may be subjected to the method according to the invention to obtain an increase of the tension and compression elastic limits with simultaneous increase of the bonding capacity.

It has also been found to be of advantage to twist together, or twist together and stretch, two or more round section bars (with ribs as aforesaid) which have themselves been twisted in the cold state, the elastic limit being thereby increased beyond the extent which has been known so far in connection with bars twisted together.

The invention is illustrated in the accompanying drawing, in which:

Fig. 1 illustrates a bar in accordance with the present invention prior to the twisting operation.

Fig. 2 is a transverse section of the same.

Fig. 3 is a view in elevation showing the bar after twisting.

Fig. 4 shows two bars, side by side, each twisted and the ribs of the respective bars offset at their meeting planes.

Fig. 5 is a transverse section through the bars of Fig. 4.

Fig. 6 shows the bars of Fig. 4 intertwisted following their independent twisting.

In Figs. 1 to 3, the bars **1** are provided with two longitudinal diametrically opposed ribs **2**. When the bar has been longitudinally twisted, as in Fig. 3, the ribs **2** are in spiral form.

In Fig. 4 two bars **3** and **4** are shown each, as will be plain from the sectional view in Fig. 5, having a single rib, the bar **3** having a rib **5** and the bar **4** having a rib **6**. These bars are independently twisted and are then relatively intertwisted, as indicated in Fig. 6.

RUDOLF SCHMIDT.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

R. SCHMIDT

TWISTING REINFORCEMENTS FOR CONCRETE

Filed Jan. 8, 1941

Serial No.
373,778

Fig.1

Fig.3

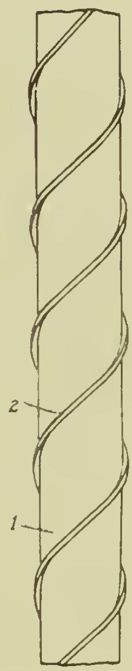


Fig.4

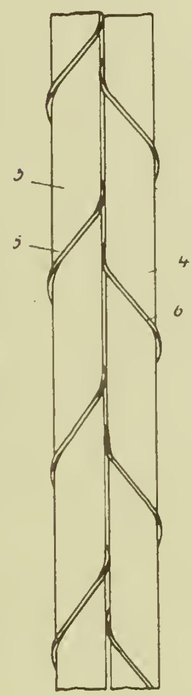


Fig.6

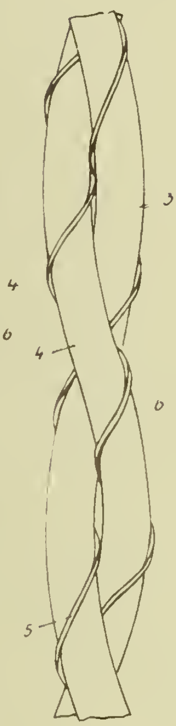


Fig.2

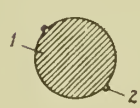
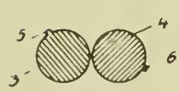


Fig.5



Inventor
Rudolf Schmidt
By
Atty

Published May 11, 1943

Serial No. 373,784

ALIEN PROPERTY CUSTODIAN

HOLLOW RING-SHAPED SEAT-CUSHION

Willy Rüsch, Rommelshausen near Stuttgart, Germany; vested in the Alien Property Custodian

Application filed January 9, 1941

The hollow ring-shaped seat-cushions, so-called pneumatic rings, of rubber, were up to the present composed of two originally plane, flat ring-shaped discs and these two discs were connected the one with the other by a reinforcing band on the inner edge and on the outer edge. The discs were cut from plane rubber plates. Herefrom resulted a very large seam face and therefore a correspondingly great danger for sources of error by bursting or any other similar damages. It is true that the seam is covered on the inner and outer side by a reinforcing band, but if the inner seam has bursted, the band can scarcely prevent the bursting. The thick seams are also disagreeable when a person sits on this cushion.

According to the invention the inconveniences of these seams are avoided in that the hollow ring-shaped seat-cushion of rubber is composed not of two originally plane discs or flat rings, but consists of a seamless hose bent in circular shape, the two ends of the hose being tightly connected the one with the other.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 shows the seat-cushion in top plan view.

Fig. 2 is a section on line II—II on larger scale.

Fig. 3 shows a similar section through a special form of construction.

The hose *a* bent to a circle is made seamless, like the air tyre for rubber tyres of vehicles, and preferably produced in the squirting process on a hose squirting machine, care having to be taken that in spite of the comparatively very great difference between inner and outer diameter a perfectly smooth, ring-shaped body is produced. The two ends of the air tube to be joined to form a ring are solidly and tightly connected the one with the other at *b*. In the drawing is indicated that the two ends overlap. They might, however, join bluntly or be fitted with band reinforcement.

By an inner piece of hose *f* an extraordinary reinforcing of the only seam point is obtained and at the same time any inconvenience for the patient is avoided by the omission of the outer seam reinforcing and by displacement in the direction of the radius to the height of the hose extension.

The hose can either have, as shown in Fig. 2, similar wall thickness *a* throughout or it may be thickened at *c* or *d*, as shown in Fig. 3. An increased strength and durability is thereby imparted to the mostly stressed zones, and to the cushion itself an especially pleasant shape is given.

The thickenings *c* and *d* may be obtained by correspondingly shaping of the mouth piece of the squirting machine.

The air valve *e* is preferably arranged at the connecting point *b* of the hose ends. According to the construction of the valve the corresponding hose extension can be selected as in the air tubes for wheel tyres, the connecting point being reinforced by canvas or in an other manner and provided at an other point and if desired reinforced.

WILLY RÜSCH.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

W. RÜSCH

HOLLOW RING-SHAPED SEAT-CUSHION

Filed Jan. 9, 1941

Serial No.

373,784

Fig. 1.

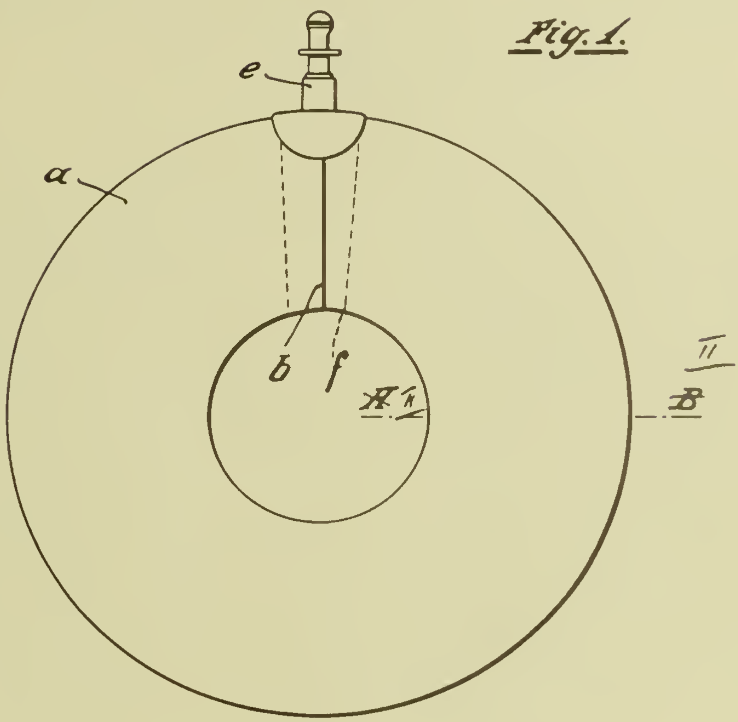


Fig. 2.

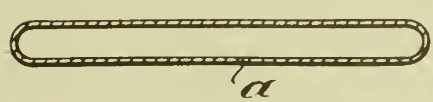
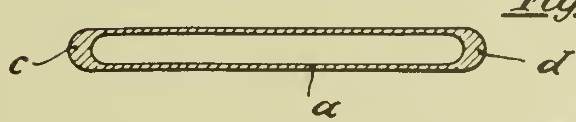


Fig. 3.



Inventor:
Willy Rüsch
By Richardson & Auer
Atty's

Published May 11, 1943 Serial No. 373,797

ALIEN PROPERTY CUSTODIAN

PROCESS FOR PREPARING CERAMIC MASSES

Fritz Gareis, Wirges (Westerwald), Germany; vested in the Alien Property Custodian

No Drawing. Application filed January 9, 1941

This invention relates to improvements in preparing moist but not pourable ceramic masses to avoid defects or irregularities caused by the development of gases within the masses.

Ceramic masses, which have been prepared with the addition of water not sufficient to make them pourable, often require subdividing the mass, for instance, by means of the helical blades of the extruding press, or, when the material is molded by hand, by forming lumps. Along the faces of contact of two portions of the mass which are rejoined in the molding process, sometimes also across one portion of the mass, a number of interstices or blisters appear in the finished stone whereby its quality is considerably diminished. This phenomenon hitherto could not satisfactorily be explained, and correspondingly all efforts to remedy this defect substantially failed.

By extensive investigations I have ascertained that the interstices do not occur in the freshly molded product but are engendered later on. As the first cause of the defect I positively recognized a development of a gas. The nature of this gas depends upon the character of certain mineral substances which are admixed to the raw material in finest distribution and cannot be discovered often even microscopically. For instance, from sulfidic minerals sulfuretted hydrogen may be produced in traces which can only difficultly be ascertained by analysis, but which suffice to considerably deteriorate the quality of the goods. Theoretically 3.74 c. cm. of sulfuretted hydrogen are formed from 0.01 grams iron sulfide. This amount suffices to provoke the strong formation of blisters in a plurality of stones. The defect is caused by an amount of sulfuretted hydrogen which appears only in the fifth decimal by way of analysis.

I found that the defect can be avoided by the addition of certain substances which prevent the formation of a gas during the time from molding to drying. Means adapted for this purpose are substances, which react with the contaminations or with the gases in statu nascendi and convert them into non-gaseous compounds. For instance, dissolved lead, copper, arsenic, antimony, tin, silver, mercury, etc., compounds transform the sulfur of iron sulfide to lead sulfide, or oxidants such as potassium dichromate, potassium permanganate, hydrogen peroxide, etc., precipitate sulfur from iron sulfide or produce sulfates. The action of carbonic acid which might be formed by the decomposition of carbonates or carbonaceous matter may be paralyzed by the addition of substances capable of absorbing or binding, under the prevailing conditions, the carbon dioxide otherwise developed. Such substances are compounds of alkaline earths or numerous compounds of heavy metals, such as lead, cadmium, silver, etc.

Examples

In practice finely distributed sulfidic minerals were admixed to fat clay; from this material clinkers were produced. Strong formation of blisters was observed. The dry material was mixed with 20% of its weight of water. By the addition of 1% of lead acetate to the water the formation of blisters was avoided. Likewise by the addition of 0.08% of potassium dichromate the formation of blisters was entirely prevented.

The proportion of the substance required for preventing the defect depends upon the quality and quantity of the gas-forming minerals contained in the raw material.

FRITZ GAREIS.

Published May 11, 1943 Serial No. 374,084

ALIEN PROPERTY CUSTODIAN

PROCESS OF SOAKING ALL KINDS OF DRIED AND SALTED HIDES AND SKINS

Carl Riess, Ludwigshafen-on-the-Rhine, Germany; vested in the Alien Property Custodian

No Drawing. Application filed January 11, 1941

This invention relates to a process of soaking all kinds of hides and skins in liquors, containing neutral-reacting phosphoric salts.

Hides, skins, and skins for fur are usually delivered to tanneries and fur dressers in dried or salted condition and, before being worked, must be brought in a condition similar to that of fresh hide, especially as far as the content of water is concerned. This is the purpose of the soaking process.

Soaking of dried hides and skins meets with certain difficulties, the dried collagen absorbing water but slowly. Long soaking periods, however, especially during the hot season, involve the risk of putrification caused by adhering dirt and leading to a loss of hide substance and a considerable reduction of the quality of the skins.

Since in many cases soaking with water alone does not satisfy, the addition of acids or alkalis has been proposed, which swell the hide and thus facilitate the absorption of water. Alkaline soaking has proved particularly effective, since by its fat-saponifying action it promotes wetting.

However, not only a suitable water content of the hide, but also its swelling condition is of great importance for the quality of the finished product. A suitably soaked hide should be in that special fallen condition by which it is characterized immediately after skinning. Acid or alkaline soaking, however, do not lead to the desired result and, moreover, their application includes certain risks consisting in the fact that acids and alkalis attack the hide, the result of which may be a loss of hide substance. For these reasons less aggressive chemicals have been searched for, which at a neutral reaction would allow to obtain the desired soaking effect. Thus, the application of wetting agents with neutral reaction, salts of aromatic sulphonic acids, ammonium rhodanate etc. for soaking purposes was arrived at. Finally, slightly alkaline solutions of enzymes have been introduced for soaking fur skins. The desired accelerating action of these compositions is, however, very limited.

Now, I have found that absorption of water can also be accelerated without swelling the hides, by soaking them in neutral or almost neutral-reacting liquors, the pH-range of which is between pH 5 and pH 8, preferably, however, between pH 6 and pH 7, these liquors being obtained by dissolving phosphoric salts, the solution of which in water is neutral or slightly acid. My soaking method is all the more surprising, since still at concentrations as low as 0,05 to 0,1% a marked effect can be observed, the intensity of which will, of course, increase with higher concentrations. Thus, for instance, a dried hide in a 2%-solution of sodium hexametaphosphate within 2 days absorbed 266% of water, whereas in pure water the absorption was only 125%. The maximum of water absorption in the above mentioned solution of metaphosphate amounted to 406% and was reached within 8 days, whilst the maximum in pure water within the same period was only 131%. The special advantage of the described new process lies in the fact that it works in a practically neutral and absolutely inaggressive solution, the swelling effect of which is nevertheless quick and intense and at the same time never leads to abnormal swelling conditions of the hide. Although water is absorbed far quicker, numerous tests have shown that the working process according to the present invention does not at all affect the hide, the amount of dissolved hide substance being smaller than it is, even at sterile conditions, in pure water within the same period.

The soaking period having been essentially abbreviated by the new process, the addition of preserving agents to the treating liquors is as a rule unnecessary. On the other hand there is no objection to their being added, eventually in connection with wetting agents.

A further advantage of the process is the dirt-solving action of the phosphate-containing solution, the soaking process thus being at the same time a cleaning process, for example in the case of dirty sheep skins. In contradiction to other additions to the soaking water, the phosphates at pH 6 to 7 do not precipitate blood and other soluble proteins; therefore phosphates can also be added to the first soaking solution.

For the process according to the invention, phosphoric salts of any degree of hydration can be employed, as for example ortho-, pyro-, poly-, and metaphosphates, the latter ones showing an especially distinct effect. The phosphates may be alkali-, ammonium-, amine-salts or complex salts of the alkaline earths. If necessary, the pH-value of the phosphates must be adjusted by adequate additions.

The effect obtained by soaking with phosphates according to the invention is not so much a wetting effect than the result of a specific action upon the dried collagen. This is shown especially by comparing the soaking action of 0,5 to 1%-metaphosphate solutions with that of wetting agents recommended for soaking. The result of this comparison is, that within an equal period the material treated in a phosphate solution had

absorbed double the quantity of water of that in a solution containing a wetting agent, the maximum of water absorption in the case of phosphate treatment being obtained within a shorter period.

The addition of phosphates or pyrophosphates has previously been proposed, it is true, but by "phosphates" only the orthophosphates are understood which, however—as for example the trisodium phosphate usually employed for industrial purposes—react highly alkaline as well as the normal tetra sodium pyrophosphate. The soaking action of these phosphates within this pH-range is like that of other alkaline-reacting agents, such as soda, sodium sulphide etc., based on their swelling action, thus facilitating the absorption of water. It could not be concluded from this state of the art that the phosphates would accelerate the absorption of water also within practically neutral solutions where generally no swelling takes place, and that the soaking action of the phosphates in neutral solutions is even essentially better than in slightly acid or alkaline liquors.

Example 1.—1 kg of sodium hexametaphosphate, pH of which had before been adjusted to 6,2, is dissolved in 1 m^3 of water, in which solution abt. 300 to 400 kg of salted calf skins are treated. After a period of 24 hours the skins are well raised and clean. A feed and smooth leather is thus obtained.

Example 2.—Dried goat skins are soaked in a liquor, containing per liter 2 g of sodium polyphosphate of pH abt. 6 and 0,1 g of a preserving agent. Water absorption takes place essentially quicker than in pure water without attacking the hide substance.

Example 3.—Java dried kips are soaked in a solution of 500 g of sodium hexametaphosphate, 50 g of a wetting agent, and 50 g of a preserving agent per m^3 at pH abt. 6. Complete soaking is obtained within a relatively short period. The leather is of high tensil strength and has a smooth, elastic grain.

CARL RIESS.

Published May 11, 1943 Serial No. 374,746

ALIEN PROPERTY CUSTODIAN

SAW WITH A FREELY PROJECTING SAW BLADE

Rudolf Gubik, Vienna, XII, Germany; vested in the Alien Property Custodian

Application filed January 16, 1941

The object of the present invention is to provide a saw having a freely projecting saw blade and requiring, owing to its peculiar construction, less effort to operate than the hitherto known types. In addition, the invention solves the problem to prevent the saw blade from running out and from bending, so that injuries of the operator are rendered impossible, due to the fact that, in its position of rest, the saw blade as a whole is enclosed in a sheath-like casing, and that the part of the saw blade handled by the operator while sawing is covered by the casing.

The hitherto employed types of hand saws are not suitable for curving because, as a rule, the width of the saw blade rapidly increases in the direction from the projecting end towards the handle, and because the saw blade has to be rather thick to prevent it from bending. The known types of frame saws and band saws, owing to the fact that they have no projecting saw blade, are not suitable for sawing exclusively from one side of the work piece, for example for sawing off a boarding fence, or for sawing through a box, or for cutting out holes in a wall, etc.

The above mentioned disadvantages of the known types of saws are obviated by the invention by providing the saw with guiding means movable with respect to the saw blade.

The subject of the invention is illustrated by way of a number of constructional examples in the accompanying drawings, in which:

Fig. 1 is a side view of the saw;

Fig. 2 is a section on line II—II of Fig. 1;

Fig. 3 is a view of the device according to Fig. 1, seen from the right hand side;

Fig. 4 is a view of the device according to Fig. 1, seen from the left hand side;

Fig. 5 is a side view of the tool in the constructional form having the handle below during operation;

Fig. 6 is a side view of the tool in a constructional form having the handle above;

Fig. 7 is a front view of the tool according to Fig. 6;

Fig. 8 shows the tool in the position while curving;

Fig. 9 shows the tool in a position while sawing in a straight line.

In Fig. 1, the saw blade 1 is enclosed in a sheath-like casing 2. Guided in longitudinal slots 4 of the casing are two sliding pieces 3, which are rigidly connected by means of wing nut screws 5 with the shell 10 and thereby with the saw blade. In the casing 2 surrounding the saw blade there are provided pins 6 guiding the saw blade along its back. Rolls 7 disposed in the casing 2 guide the saw blade in the casing near the place of cutting. Instead of the rolls 7 and the pins 6, there may be provided rollers or balls to prevent the teeth of the saw from jamming at the casing when curving, and to reduce or prevent sliding friction. A draw spring 8 is attached at one end to the rear part 9 of the casing 2, and at the other end to a shell 10 slipped over the casing, which shell has the handle 15 attached to it. Two rivets 13, 13 hold the two scales of the handle together.

From Fig. 2 will be seen that the two lateral sliding pieces 3 are rigidly connected with the saw blade 1 by means of bolts 16 of the wing nut screws 5 and with the shell 10.

In Fig. 3 will be seen the handle 15, the shell 10 surrounding the draw spring 8, the rear part 9 of the casing 2, and the side walls 1', 1' of the casing. The bolt 16 of the wing nut screw 5 passes through the saw blade 1 and the two sliding pieces 3 at the sides of the saw blade.

Fig. 4 shows the saw blade 1, which is guided between the two rolls 7, 7. At the front of the tool there are attached rubber coverings 17. Adjoining the latter is a roughened or toothed part of the front wall of that part of the casing 2 which rests on the work piece where it is cut (Fig. 1).

Fig. 5 shows the saw blade 1, the shell 10 with the handle 15 attached thereto, and the casing 2 which accommodates the saw blade. A pointer 12 is attached to the tool.

The action of the device is as follows:

In the position according to Figs. 5, 8, and 9, the tool is placed with the pointer on the marked cutting line of the work piece. When cutting, the handle is moved, for example with the right hand, from its upper position down towards the work piece. As the tool is held by the holding means 17 or 18 resting on the place of cutting, and as the edge of the saw forms a certain angle α with the moving direction (Fig. 1) of the saw blade, the saw blade, in being moved in longitudinal direction, penetrates with its teeth the work piece, the draw spring 8 being tensioned at the same time. At the end of the stroke, the saw returns to its initial position and at the same time the casing is pressed by means of the spring 8 against the place of cutting, the saw blade remaining continuously covered from outside. At the same time, the tool is moved with the hand along the marked cutting line in the direction of the arrow p' in Fig. 5, whereupon the next operating stroke is effected.

In the constructional form shown in Fig. 6, the tool is connected according to the invention with a bearing support 19 shiftable along the tool, the handle 15 being arranged at the top of the tool. The handle 20 serves to take hold of the tool, or as a support for the left hand while sawing, or to facilitate the guiding of the tool in curving, as the case may be.

When pressing down the handle 15 in the direction of the force P, the latter is resolved, as will be seen from the diagram of forces, into the two partial forces P_1, P_2. The partial force P_1 effects the parallel motion of the handle 15 with respect to the bearing support. The partial force P_2 acts perpendicularly to the bearing support. The partial force P_2 is resolved into the two partial forces p_1 and p_2. The partial force p_2 is transferred by the bearing support to the work piece, whereas the partial force p_1 causes the saw blade to penetrate the work piece. During the operating stroke, the bearing support moves automatically along the cutting line marked on the work piece in the direction of the partial force p_1. The bearing support may also be moved during the operating stroke over a space corresponding to the cutting depth (the feed).

From Fig. 7 will be seen that the bearing support 19 provides with its widely projecting legs a secure guide for the tool along the work piece. On both sides of the tool there are arranged draw springs 8.

Fig. 9 shows the saw effecting a straight cut at the start of the operating stroke. In this position, the tool is held at the place of cutting by means of the rubber covering 17. In Fig. 8, the tool is held by pressing the roughened or toothed part 18 of the tool against the work piece.

Since the device according to the invention permits to employ saw blades of any desired thinness, it is possible to effect curvings with very small radii, and the saw blade is prevented by the guiding means from running out. The saw blade cannot be damaged, nor can the operator of the device be injured, since the saw blade remains in the casing during the operating stroke as well as in the position of rest.

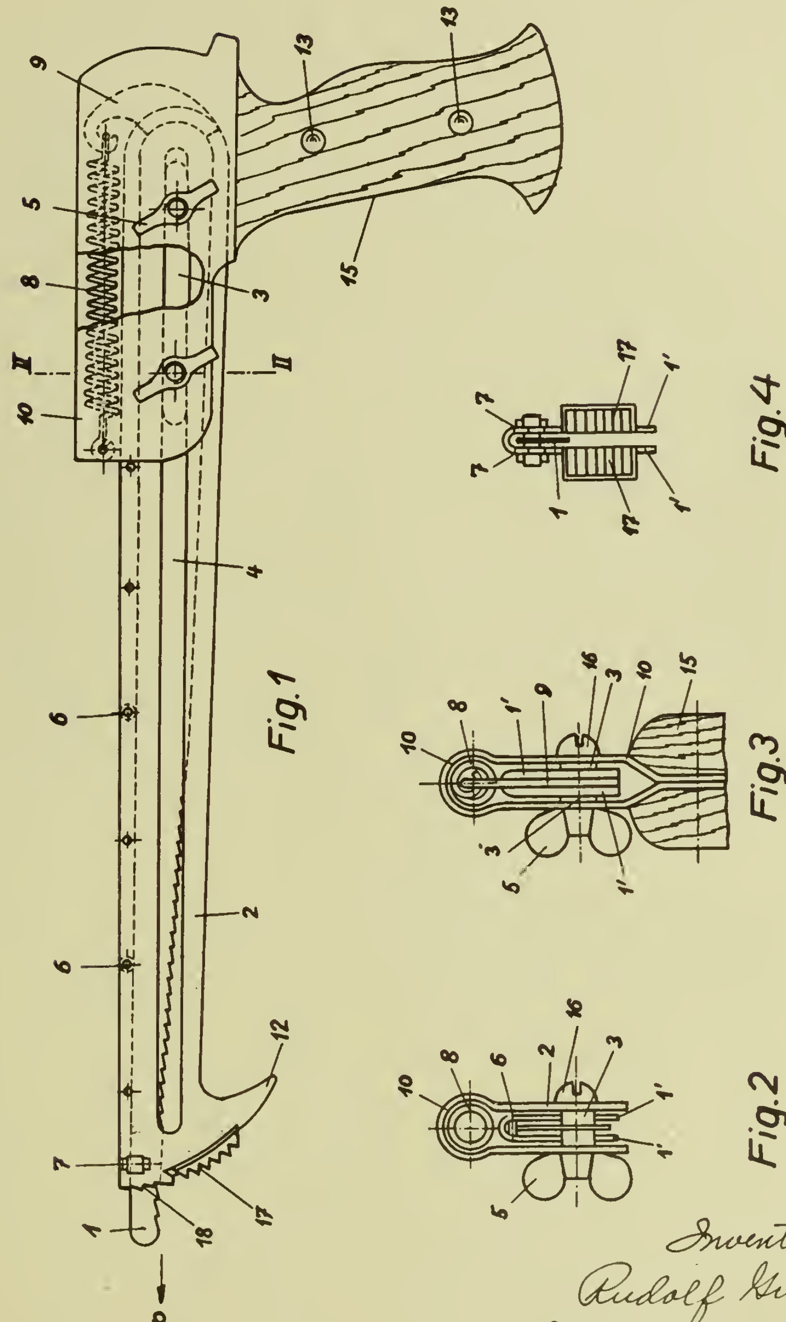
The scope of the invention also comprises all saws of similar construction with a freely projecting saw blade driven by means of a motor arranged either on the tool itself or separately, or driven by means of a hand operated crank.

For example, it would be possible to arrange the driving motor for the saw on a bearing support attached to the work table. In this case, the saw or the tool would have the position with respect to the work piece shown in Fig. 8. To let the lower part of the freely projecting saw blade pass through, the work table would have to be provided with an opening. The motor-driven saw blade would then move upwards and downwards in longitudinal direction and would thus replace the usual band saws. In this case, the work piece would be fed by hand to the upwards and downwards moving saw blade along the work table according to the desired cutting direction.

The saw according to the invention also has considerable advantages of an economical nature as compared with the known types of frame, band, and felling saws. In the manufacture of the saw, permitting to employ exceedingly thin, narrow, and short saw blades, expensive material is saved and the costs of production are reduced. The saw, being constructed so as to take up little room, is easy to transport and will save labour and material owing to its comprehensive possibilities of use as compared with the known types of saws. Hitherto, different kinds of saws were required for the most of the occurring saw work, especially the frame saw for straight cutting, the curving saw, and the hand saw. All these operations can be effected by the saw according to the invention.

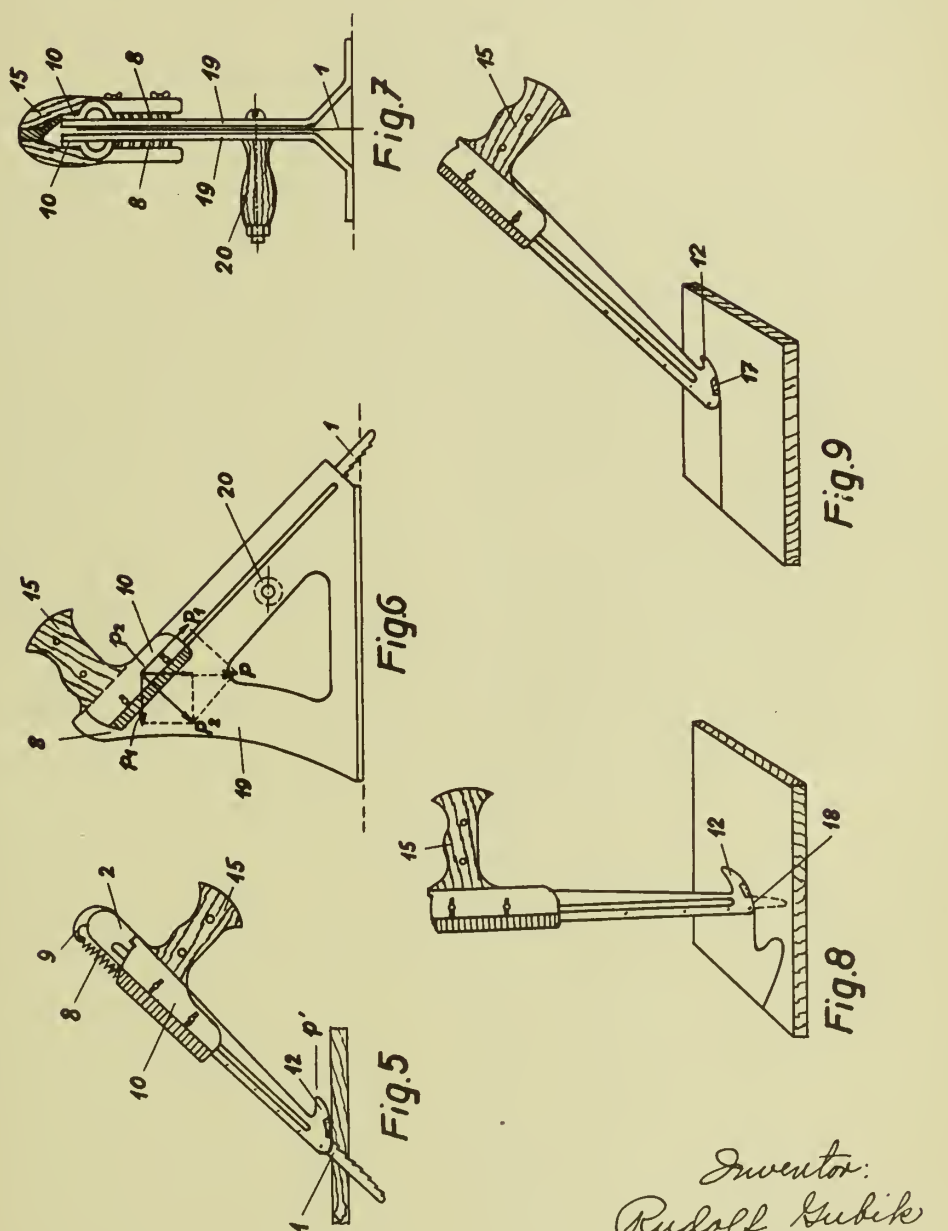
RUDOLF GUBIK.

PUBLISHED	R. GÜBIK	Serial No.
MAY 11, 1943.	SAW WITH A FREELY PROJECTING SAW BLADE	374,746
BY A. P. C.	Filed Jan. 16, 1941	2 Sheets-Sheet 1



Inventor:
Rudolf Gubik
By: Mason, Porter
Attorneys

PUBLISHED	R. GÖBIK	Serial No.
MAY 11, 1943.	SAW WITH A FREELY PROJECTING SAW BLADE	374,746
BY A. P. C.	Filed Jan. 16, 1941	2 Sheets-Sheet 2



Inventor:
Rudolf Gubik
By: Mason & Porter
Attorneys

Published May 11, 1943

Serial No. 374,611

ALIEN PROPERTY CUSTODIAN

LOW-PRESSURE STEAM HEATINGS FOR VEHICLES

Hans Appel, Prag, Germany; vested in the Alien Property Custodian

Application filed January 16, 1941

The present invention relates to low-pressure steam heatings for vehicles provided with an own steam generator.

To be practically usable and to ensure safety during operation, a low-pressure steam heating for vehicles provided with an own steam generator requires a manufacture thoroughly considering not only the constructional conditions of the vehicle, but also the operative requirements, for instance most simple construction and payment of as least attention as possible.

In hitherto known plants of this kind the steam generator was provided with automatically operating means for the regulation of the steam pressure and the water supply and, moreover, the heating plant connected to the boiler was provided with means for automatically regulating the current of the heating medium passing through and the temperatures of the heating surfaces. In most cases the boiler together with the furnace were mounted in a special compartment or in a space below the vehicle, the attention to be paid to the steam generating plant and its maintenance imposing special responsibility and troubles upon the personnel attending the train. The attention of the heating itself also required a certain carefulness of the personnel attending the train on starting and stopping the heating plant.

Now the object of the invention described below is to provide a low-pressure steam heating for vehicles having an own steam generating plant in which a maximum of simplicity is obtained and in which with regard to attention very slight requirements are imposed upon the personnel attending the train, whereby a high degree of reliability or safety of service is ensured.

To obtain the object aimed at, a steam generating plant, automatically controlled as far as the steam generation and the water supply are concerned, is used not only to provide the radiators with heating steam, but simultaneously also to control the temperature of the heating surfaces of the radiators connected to the steam generating plant. To this end the radiators are so connected to the steam space of the boiler of the steam generating plant that their interior spaces and the steam space of the boiler form a coherent space closed in itself in which the same steam pressure prevails at all places. Moreover, a device is provided at the boiler for automatically controlling this steam pressure and thereby also for automatically controlling the temperature of the heating surfaces of the radiators connected to the boiler. In this manner all special devices for the radiator are rendered superfluous which hitherto were required for controlling the steam supplied to the radiators and maintaining uniform the temperature of the heating surfaces of the radiators. By using suitable additional devices, depending on the temperatures prevailing in the compartments, and acting upon the control devices of the steam generating plant, such a construction of the heating plant allows a central regulation of the temperature of the individual compartments by the regulation of the steam generating plant.

To control the steam pressure in the boiler, an ascending-pipe known per se may be used leading from the water space of the boiler upwardly into the atmosphere and preferably discharging above the water level of a water storage tank. For a limited number of radiators the height of the ascending-pipe adapted to be used in the vehicle is sufficient to maintain any desired pressure in the boiler which is necessary for the supply of all the radiators with steam, so that in all the radiators the same steam pressure prevails as in the boiler and the temperature of the heating surfaces corresponding to this steam pressure is maintained.

As due to want of space in a vehicle, the boiler must be kept small and, therefore, the water storage in the boiler would very soon be spent, the invention provides, besides this steam pressure regulation and for its assistance, an automatic water supply for the boiler which consists of a water filling pipe system leading from the lower portion of the water space of a highly arranged storage tank and discharging into the water space of the boiler which pipe system is automatically closed by a closure member, preferably a float, and mechanical or electromagnetical means influenced by said float as soon as a predetermined height $h_{max.}$ of the water level of the boiler has been reached. This arrangement has the following effects: As soon as the water level of the boiler drops from the height $h_{max.}$ the water filling pipe system is opened by the above mentioned closure member and from the highly arranged tank water flows to the boiler until the predetermined height of the water level $h_{max.}$ is reached again. Hereby the pressure in the boiler never can rise above the height possible in the stand-pipe, because any increase of the steam pressure above this height is prevented by the fact, that by way of the stand-pipe water is pressed back into the highly arranged water tank. As hereby the water level drops and the above mentioned water-

pipe filling system is opened, cold water flows into the boiler after a corresponding slight drop of pressure obtained by discharging of steam, whereby not only the water in the boiler is supplemented, but also the necessary drop of pressure is accelerated. In this manner the same steam pressure is maintained in the boiler and simultaneously also in all the radiators connected to the boiler. Moreover, the temperature of the heating surfaces of the radiators is automatically regulated.

However, if a larger number of radiators is connected to the boiler, as is the case for instance with rail-cars with trailers, the radiators of which also are to be supplied with steam from the steam generating plant arranged upon the motor car, the steam pressure is no longer sufficient which is limited by the height of the column of water in the stand-pipe provided at the vehicle. With this pressure the same steam pressure as that prevailing in the boiler cannot be maintained in all the radiators.

To render the plant fit for use for this case also, a closure member for regulating the temperature of the heating surfaces to a height above the pressure limited by the height of the stand-pipe is provided in the pipe system leading from the boiler by way of the stand-pipe into the atmosphere which closure member is opened by the action of a float, as soon as the permissible minimum water level $h_{min.}$ is reached, but which is maintained closed as long as the water level of the boiler lies above this minimum height. Moreover, a pressure sensible control member is provided in the boiler which influences the boiler furnace in such a manner that the desired higher boiler pressure is maintained. A water filling pipe system leading from the water space of a highly located water storage tank and discharging into the water space of the boiler is provided in which a closure member is arranged which is so influenced by a float that it is opened as soon as the water level of the boiler drops to the predetermined minimum height $h_{min.}$ and which closes as soon as the highest water level $h_{max.}$ is reached. For this purpose for instance the same float may be employed which controls the above mentioned closure member arranged in the stand-pipe.

This arrangement allows the pressure sensible control member influencing the furnace to maintain a regulated steam pressure in the boiler as long as the closure member in the stand-pipe is closed and the water level in the boiler lies between the permissible limits $h_{max.}$ and $h_{min.}$ which steam pressure is higher than the column of water limited by the height of the stand-pipe. This steam pressure now determines the temperature of the heating surfaces of all the radiators connected which temperature is maintained uniform. However, if the water level of the boiler drops to the permissible minimum height $h_{min.}$, then the passage through the stand-pipe into the atmosphere is opened under the influence of the float mentioned above and first of all water is pressed by way of the stand-pipe into the highly located tank and finally steam also is blown into the atmosphere, so that the boiler pressure is lowered so far that by way of the open closure member in the water filling pipe system water may flow from the highly located tank into the boiler until the water level in the boiler has reached again the admissible maximum height $h_{max.}$ Now the pipe system leading by way of the stand-pipe into the atmosphere is closed again and the pressure controlled by the pressure sensible control member is again adjusted in the boiler and in the radiators.

Preferably, the pressure sensible control member is formed from a daphram box which by way of a liquid system and mechanical or electrical transfer members connected to this system more and more throttles the fuel supply to the furnace on increasing boiler pressure and finally closes the fuel supply on reaching the admissible maximum boiler pressure.

To obtain a quick drop of pressure in the boiler as soon as the water level of the boiler is lowered to the admissible minimum height $h_{min.}$, i. e. to obtain by way of the water filling pipe system opened at this time a quick refilling of the boiler up to the maximum water level $h_{max.}$ it is preferable to lead the above mentioned stand-pipe from the water level of the boiler indicating the minimum height of the water. On reaching the minimum water level and after pressing back into the highly located storage tank the water contained in the stand-pipe, boiler steam is discharged into the atmosphere and due to the quick drop of pressure accompanied thereby, the refilling operation may be accelerated. As the above mentioned pressing of water into the highly arranged tank by way of the stand-pipe causes at a corresponding boiler pressure a troublesome noise, it is advantageous to mount in the stand-pipe a throttling member, for instance a narrow, eventually helically wound small tube which offers a larger resistance at the passage of water than to the passage of steam, whereby, after opening of the closure member mounted in the stand-pipe, the noise due to the discharge of water is deadened.

To control the closure member provided in the boiler filling pipe system, a magnetic valve also may be used in accordance with the invention the circuit of which is so controlled by a float that this valve is closed as soon as the water level of the boiler reaches a predetermined maximum height $h_{max.}$ and is opened as soon as the water level of the boiler is dropped to the admissible minimum height $h_{min.}$

The filling operation occurs if the float has opened the boiler filling pipe system after dropping of the water level of the boiler to the height $h_{min.}$, and preferably electrical means may be actuated by the above mentioned float which stop the boiler furnace at this time, so that the steam generation is interrupted during the filling operation for accelerating the latter and for saving the boiler heating surface not in contact with water at this time. The arrangement then is such that the boiler furnace is operated again as soon as the water level of the boiler has reached again the predetermined height $h_{max.}$

In the accompanying drawings two heating arrangements according to the invention are shown by way of example.

In these drawings:

Fig. 1 shows a broken away more or less diagrammatic view of a low-pressure steam heating according to the invention.

Fig. 2 is a side elevation of a detail shown in Fig. 1, and

Fig. 3 shows more or less diagrammatically a modification of a low-pressure steam heating according to the invention.

In the heating plant shown in Fig. 1 a low-pressure steam boiler 1, embedded in refractory bricks, is mounted upon suitable beams of the vehicle, for instance below the floor. In the

height of the selected minimum water level, a U-shaped stand-pipe 5 extends downwardly and then leads from the water space of the boiler 1 upwardly until above the water level of the water tank 24 mounted below the roof of the vehicle. Moreover, from the water space of the boiler a second pipe 4 is led upwardly which discharges into the bottom of the highly arranged storage tank 24 and forms part of a filling pipe system for supplementing the water contents of the boiler. This pipe 4 of the boiler filling pipe system is controlled by a closure member 3, i. e. in the modification shown by a piston actuated by the float 2, in such a manner, that on reaching the maximum water level in the boiler 1 the piston closes the passage through the pipe 4. Therefore, water will flow from the higher located tank 24 by way of the pipe 4 into the boiler. as long as the maximum water level in the boiler 1 is not reached and the pressure prevailing in the boiler allows this. However, if the maximum water level is reached the pipe 4 is closed. Up to this time the difference in height of the water level in the highly located tank 24 with regard to the water level of the boiler determines the pressure in the boiler. If the boiler filling pipe system is closed, the boiler pressure is determined by the column of water in the stand-pipe 5, whereby the closure member, shown in Fig. 1 mounted in the pipe system leading from the boiler by way of the stand-pipe 5 into the atmosphere, i. e. the piston 6, is first of all to be supposed not to be present.

The boiler 1 is heated with heating oil, naphtha or any other suitable fuel. Fuel from the higher located fuel tank 25 is supplied to the burner 29 by way of a pipe 27. The necessary combustion air may eventually be supplied by a blower 10 which for instance may be electrically driven and be connected to the burner 29 by the pipe bend shown.

By way of the pipes 31, 18 the steam space of the boiler 1 is connected to the radiators 19 which, when the inlet valves are opened by the setting levers 21, are all maintained filled with steam of the same pressure as that of the boiler, whereby the temperature of their heating surfaces is maintained equal to the steam pressure controlled by the height of the stand-pipe 5.

During the period of time the heating is in operation, the piston 6, however, closes the passage leading from the boiler by way of the stand-pipe 5 into the atmosphere and a bellows 14, filled for instance with glycerine, is provided to regulate the steam pressure in the boiler 1. On being compressed the bellows 14 feeds glycerine by way of the pipe 13 to a spring loaded piston of the cylinder 12 which is moved thereby and swings the lever 16. In Fig. 2 of the drawings the cylinder 12 and the lever 16 are shown in detail and in side elevation. By this arrangement the burner is so controlled and the firing of the boiler 1 is so influenced that a predetermined pressure of sufficient height is maintained in the boiler which ensures the supply of all the radiators connected to the boiler with steam of the same pressure.

In the stand-pipe 5 a throttling member 22, for instance in the form of a helically wound small tube not shown in the drawings, may be inserted which offers less resistances to the passage of steam than to the passage of water. If the pressure in the boiler rises while the passage into the atmosphere by way of the stand-pipe 5 is open, i. e. of the piston 6 is drawn upwardly, water may be pressed up through the stand-pipe 5 and flow with dampened energy into the tank 24. If the water level in the boiler 1 is dropped to the predetermined minimum height, steam only is discharged by way of the stand-pipe 5 and nearly no resistance is offered by the throttling member 22 to the passage of this steam, so that pressure compensation with the atmosphere is quickly reached, and the re-filling operation with water from the higher located tank into the boiler is initiated as follows:

With a larger number of radiators connected, the maintenance of this state, however, would fail, because for this purpose the pressure limited by the maximum possible height of the stand-pipe would not be sufficient. For this purpose, the closure member 6, i. e. a piston, is arranged in the pipe system leading by way of the stand-pipe 5 from the boiler 1 into the atmosphere which piston in the modification shown is connected to the closure member 3 mounted in the boiler filling pipe system 4, in such a manner that on reaching the predetermined minimum water level in the boiler, the float 2 has drawn upwardly the piston 6 so far as to open the passage through the stand-pipe 5.

The drop of the water level is accompanied by a drop of the float 2 and an opening of the water supply from the tank 24 by way of the pipe 4 into the boiler 1, the slide 3 occupying its raised position. If the water level of the boiler is dropped to the predetermined minimum height $h_{min.}$, the above mentioned pressure compensation with the atmosphere is effected by way of the stand-pipe 5 and cold water begins to flow from the tank 24 to the boiler 1, whereby the development of steam in the boiler is reduced which accelerates the refilling operation.

If the permissible maximum water level is reached, the closure members 3 and 6 closed again and the steam pressure in the boiler is raised. Now, if this pressure has reached a predetermined height, the supply of oil to the burner is interrupted by the pressure control member 14 acting by way of the piston arranged in the cylinder 12 and the lever 16. In this manner the pressure in the boiler 1 and in the radiators 19 connected thereto is regulated by the pressure control member 14 to the predetermined height until the water level in the boiler is dropped again to the minimum height $h_{min.}$, whereupon the refilling operation described above is repeated and simultaneously the pressure in the boiler is reduced.

If due to the small number of radiators 19 connected to the boiler, a closure member 6 is not required in the passage leading from the boiler by way of the stand-pipe 5 into the atmosphere, then for regulating the pressure in the boiler and in the radiators the column of water in the stand-pipe 5 is sufficient, whereby for assisting this pressure regulation a corresponding control device for the firing may be provided in the form of a bellows or diaphragm box 14 which influences the burner 29. The regulating operations are effected as follows:

If the boiler pressure has reached a predetermined height, the supply of oil to the burner is interrupted by the pressure control 14 by way of the piston in the cylinder 12 and the lever 16, the burner, however, continuing to burn for several seconds. In this moment the water pressing upwardly in the stand-pipe 5 overcomes the resistance of the throttling member 22, and water flows into the tank 24. The float 2 drops. There-

by, in the manner already described, water is again discharged from the tank 24 into the boiler, the pressure drops, the lever 16 again effects opening of the fuel supply and the burner 29 is ignited by a pilot flame, whereupon this operation is repeated. If the water level in the boiler 1 drops below the predetermined minimum height, i. e. below the edge x of the stand-pipe 5, then, after pressing of the water out of this tube into the tank 24, steam flows into the atmosphere above the tank, whereby the pressure in the boiler quickly drops. Moreover, if the overpressure in the boiler should exceed the highest permissible limit, a safety valve 33 is opened which is provided in the steam drawing off pipe 31 of the boiler leading to the radiators 19.

To increase the reliability of service of the heating plant which also depends on a sufficient quantity of water always being available in the higher located tank 24 for refilling the boiler, it is preferable to collect the condense water of the radiators 19 in a collecting tank 15, and to provide a return feeding passage for this condense water from this tank to the boiler 1. As shown in Fig. 1 this return feeding passage leads from a collecting tank 15 over a supply device 11, driven by the motor driving the blower 10 also, and over the highly arranged water storage tank 24, and then from the latter over the boiler filling pipe system 4 discharging into the water space of the boiler.

In this steam drawing off pipe 31 a closure member 9 is mounted for centrally closing or disconnecting all the radiators 19. To obtain for a further safety of the heating plant an automatic discharge of water of the entire heating plant after disconnecting of the latter, the outlet valve 7, provided at the bottom of the boiler 1, and the outlet valve 8, arranged at the lowest point of the water return feeding pipe system 35 may mechanically or electrically be connected to the above mentioned central closure member 9 in such a manner, that after closing the closure member 9 the above mentioned outlet valves 7 and 8 open. Then water flows off into the atmosphere from all parts of the heating plant filled with water, particularly also the water from the tank 24 by way of the boiler filling pipe system 4, the boiler 1 and the outlet valve 7, so that any danger of freezing in is automatically prevented. The flowing off of water from the tank 24 may be avoided by closing the valve 23 provided in the boiler filling pipe system 4, if it is intended to have this water available as useful water for other purposes.

As it sometimes happens that the vehicle provided with this heating plant is to be arranged in a train which is drawn by a steam locomotive supplying the heating devices of all cars with steam, the closure member 9, mounted in the steam draw off pipe of the heating plant, is, according to Fig. 1, formed as a two-way valve in such a manner, that this valve 9 in its position, closing the steam draw off pipe 31 towards the boiler 1, connects the radiators 19 by way of the branch pipe 32 to the pipe 30 located below the vehicle and to the main steam pipe of the train by means of couplings.

The modification illustrated in Fig. 3 shows a low pressure steam heating of the same kind in which the upper end of the boiler filling pipe system leading from the highly located tank downwardly into the boiler 1, is controlled at the tank 24 by a magnetically operated valve 40 the control circuit of which is subjected to the action of a float 16 in the boiler in such a manner, that, when the predetermined maximum water level is reached in the boiler, the control circuit is opened and the valve 40 is closed. As long as the control current flows the magnetically operated valve 40 is maintained open, and, if the boiler pressure allows, water may flow from the tank 24 into the boiler 1 by way of the boiler filling pipe system.

This filling pipe system leads from the tank 24 by way of the magnetic valve 40 and the short pipe 47 into the vertical pipe 4 the lower end of which discharges into the water space of the boiler near the bottom of the latter. The pipe 4 of this boiler filling pipe system, however, simultaneously forms a portion of the stand-pipe, designated 5 in Fig. 1, as about in the height of the predetermined minimum water level $h_{min.}$ the pipe socket 58 connected to the water space of the boiler leads to this pipe 4 the upper end of which is connected by a bend or elbow 4′ to the interior space of the tank 24 above its highest water level. This arrangement acts in exactly the same manner as the system of pipes 4 and 5 described in connection with the construction shown in Fig. 1.

The control current of the magnetically operated valve 40 is supplied from a battery 41 by way of a main switch 42, an automatically acting auxiliary switch 46 and a bridge contact switch 45 which is so actuated by the float 16, that on reaching the highest predetermined water level of the boiler the magnetic valve 40 is rendered currentless and closes the boiler filling pipe system 47, 4.

In dependence of the water level of the boiler, moreover the boiler furnace, i. e. the fuel supply to the burner 28, also is controlled by the float 16. The fuel supply from the tank 25 is effected by means of an electrically driven pump and the blower 10 which preferably is driven by the same motor as the pump. This control also is effected by means of a circuit supplied with current from the battery 41 over the main switch 42 and the auxiliary switch 46, which circuit is opened by the float 16 if the maximum limit of the water level of the boiler $h_{max.}$ is reached, whereby the boiler firing is rendered operative.

The top and the bottom of the float 16 preferably are resiliently mounted by means of a spring member 55, and during dropping of the water level of the boiler from $h_{max.}$ to $h_{min.}$ the member 55 performs a relatively small way of about 10 mm for instance only. The float 16, in a manner known per se, acts, by means of a small piston, upon the contact bridge of the switch 45.

By way of the auxiliary switch 46, a time- and protection-switch 51 also is connected into the control circuit of the motor for the fuel supply pipe and the blower 10. If the heating plant is set in operation, the time switch at first is closed. After a short period of time, i. e. after about a minute, however, the switch is opened and closes the circuit of the control current as soon as a temperature feeler 51′, preferably an expansion- or bimetal-body, arranged in the chimney 52 of the firing, is heated. If the burner 25 is not ignited, the circuit of the motor for the firing is opened, so that the firing is rendered inoperative. Simultaneously a control lamp 53 is lighted which indicates this faulty or incorrect state. This may mean that either no fuel is present in the tank 25 or the nozzles of the burner 29 are contaminated or clogged.

To control the firing in dependence of the

height of the temperature of the heated space, a space temperature feeler 54 is arranged at a corresponding place in the space of the car which feeler also acts upon the circuit driving the motor for the burner 29 and the blower 10 in such a manner, that, on reaching a predetermined space temperature of about 20° C., the firing is rendered inoperative. If the temperature in the heated space drops again, for instance to 19° C., the circuit is closed again by means of the temperature feeler 54 and the burner is operated again. Hereby preferably an electric high voltage ignition is used having two electrodes located above the burner nozzle.

The automatic return of the water into the boiler 1 in the heating plant according to Fig. 3 is effected by leading the steam draw off pipe 31, supplying the radiators 19 with steam, to a highest point at which a thermostatically controlled valve 50 is arranged which is closed on steam passing through it. When the plant is set in operation, first air is discharged through this valve 50 until steam begin to flow into the atmosphere and starts to heat the thermostat of the valve. After closing of the valve 50, the boiler 1, the steam draw off pipe 31 and the radiators 19 connected to the boiler as well as the condense water pipe 48 in which collects the water from the radiators form a coherent space closed in itself in which at all points the same pressure prevails. As the collecting pipe 48 discharges near the bottom of the boiler into the water space of the latter, the condense water formed in the radiators 19 always automatically returns into the water space of the boiler.

To obtain an automatic discharge or emptying of the part-s of the heating plant filled with water after the plant has been rendered inoperative, an electrically controlled valve 44, for instance a thermostatically controlled valve, is arranged at the bottom of the boiler 1 the thermostat of which is heated by a heating coil which, by way of the main switch 42, is supplied with current from the battery 41. Therefore, as soon as the main switch 42 is closed, the heating coil is heated and the thermostat 43 closed the valve 44. If by opening of the main switch 42 the heating plant is rendered inoperative, the thermostat 43 is cooled due to want of heating current, the valve 44 is opened and the water from the heating plant flows into the atmosphere. Hereby, however, the valve 40 closes due to want of its control current, and the water in the water tank 24 is retained for other purposes of use. If danger of freezing exists, a special emptying valve for the tank 24, operated by the man attending the car is to be opened in this case which operation is known to him from the usual lavatories in railway cars.

In a very simple manner the heating plant may be set in operation. The tank 24 is filled with water and the switch 42 is closed. Of course, care is to be taken also that the tank 25 is filled with fuel. As soon as the main switch 42 is closed, the valve 40 is opened and water flows into the boiler 1 over the boiler filling pipe system 47, 4. Of course, in the meantime some water also flows off by way of the still open discharge valve 44 into the atmosphere. However, this flow of water is stopped already after a short period of time as soon as the heating coil heats the thermostat 43 and the valve 44 is closed.

If now the boiler is filled with water to the height $h_{max.}$ the float 16 actuates the bridge contact switch 45 and opens the control circuit of the valve 40 so that the latter closes. Simultaneously by way of the auxiliary switch 46 the bridge contact switch 45 cuts in the control circuit of the burner motor. As soon as a sufficiently high steam pressure is present in the boiler 1, steam is supplied to the radiators 19 by way of the pipe 31. This steam by way of the valve 50 presses the air out of the heating system and finally closes the valve 50 by heating the appertaining thermostat. Now, the same pressure as in the boiler 1 is adjusted in the radiators 19 and in the condense water pipe 48. With increasing pressure the column of water in the stand-pipe 4, 4 rises. By way of the pipe 48 the condense water which is formed in the radiators flows back to the water space of the boiler, whereby the water level in the pipe 48 adjusts itself to that of the boiler 1.

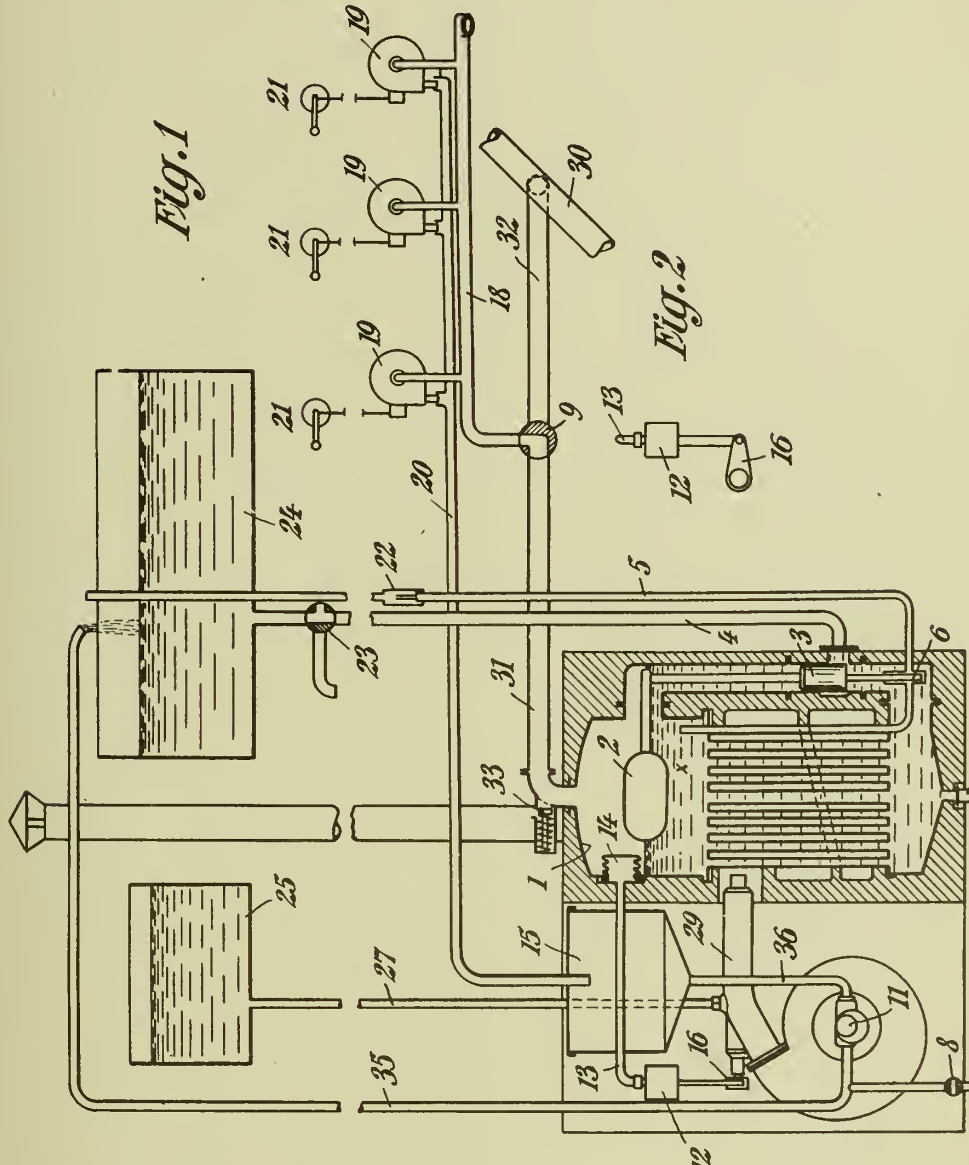
If now the pressure in the boiler 1 is raised so high that water from the water space of the boiler is pressed upwardly by way of the stand-pipe 4, 4′ into the tank 24, the water level in the boiler drops, the float drops and cuts out the control circuit of the burner motor and cuts in the circuit of the valve 40, the burner is extinguished, the valve 40 is opened and cold water flows to the water space of the boiler and prevents further rise of the boiler pressure. If nevertheless the boiler pressure further rises, then on reaching a level below a predetermined minimum water level of the boiler $h_{min.}$, the steam is blown off by way of the connecting pipe 56 towards the water flowing off from the valve 40 by way of the pipe 4, 4′ until the proper boiler pressure and the corresponding water level are reached, whereupon the operation described is repeated.

HANS APPEL.

PUBLISHED	H. APPEL	Serial No.
MAY 11, 1943.	LOW-PRESSURE STEAM HEATINGS FOR VEHICLES	374,611
BY A. P. C.	Filed Jan. 16, 1941	2 Sheets-Sheet 1

Fig. 1

Fig. 2



Inventor
Hans Appel

By Karl A. Mayr
Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. APPEL

LOW-PRESSURE STEAM HEATINGS FOR VEHICLES

Filed Jan. 16, 1941

Serial No.
374,611

2 Sheets-Sheet 2

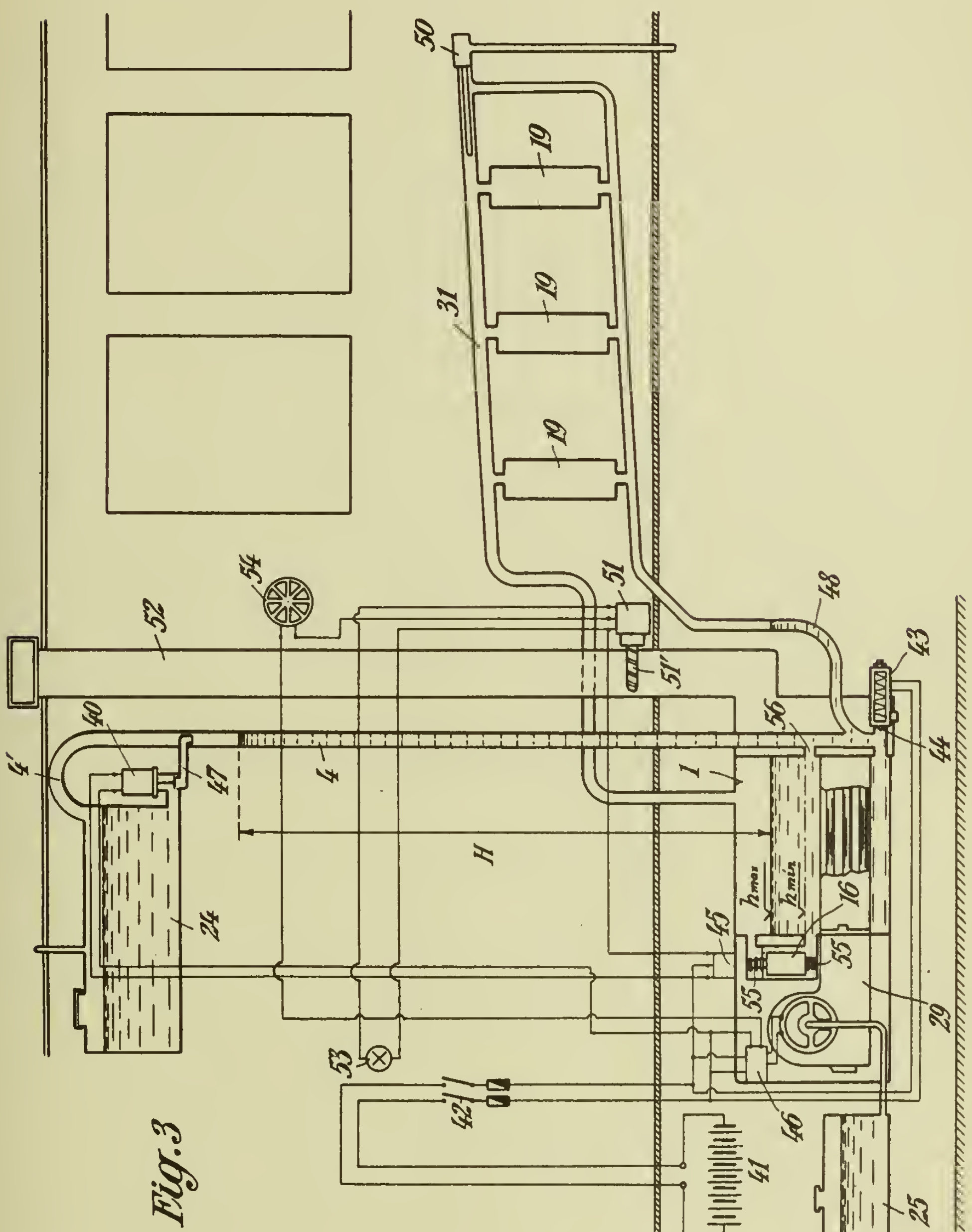


Fig.3

Inventor
Hans Appel

By *Karl A. Mayr*
Attorney.

Published May 11, 1943

Serial No. 375,680

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF LEAD AND BORON FREE GLAZES

Wilhelm Diether, Kelsterbach A. Main, Germany; vested in the Alien Property Custodian

No Drawing. Application filed January 23, 1941

The problem of the production of glazes which contain neither lead nor boron is very old and numerous investigations have already been made to find a satisfactory solution. But the glazes obtained could only be used at firing temperatures over 1100° C. The desire of the ceramic manufacturer, however, is directed to firing temperatures which are as low as possible, the high temperatures partly destroying the under glaze colors and partly changing the physical qualities of the fired ceramic material in a very unfavourable manner.

Now it was found that according to my invention glazes may be produced which contain neither boron nor lead and whose firing temperatures are below 1000° C. In contrast with the hitherto known methods for the production of glazes, the alkali is not added in form of sodium monoxide as the alkali in form of sodium monoxide tends to capillary cracks. In consequence thereto the alkali is added to the batch in the form of potassium monoxide in quantities of 0,4–8 molecules, preferably 0,5–0,7 molecules according to the Seger formula.

Moreover, I have found that, with respect to the glazes and the low firing temperature, it is advantageous to keep the content of barium oxide as low as possible. Glazes which contain considerable amounts of barium oxide sometimes get a dull coating during the firing process in the ceramic furnaces which coating exists substantially of barium sulfate, separated out from sulphur-containing furnace gases.

A further object of my invention is seen in the increase of the silica content. Quantities of 3,6–5,0 molecules, preferably 4–4,5 molecules of silica, according to the Seger formula, are added. In spite of this relatively high content of silica it is possible to maintain a fusion point of the glazes which is far below of all hitherto known firing temperatures for glazes free from boron and lead.

The glaze composition, i. e. the substitution of sodium monoxide by potassium oxide with a very low content of barium oxide and an increased content of silica yields to glazes with final firing temperatures below 1100° C., even below 1000° C.

In carrying out my invention I proceed as follows:

A glaze of the Seger formula

$$\left.\begin{array}{l}0{,}55 \text{ molecules } K_2O\\ 0{,}10 \text{ molecules } ZnO\\ 0{,}15 \text{ molecules } CaO\\ 0{,}10 \text{ molecules } MgO\\ 0{,}10 \text{ molecules } BaO\end{array}\right\} \quad 0{,}2\ Al_2O_3.4{,}2\ SiO_2$$

is made from the customary ceramic starting materials. After mixing the starting materials are melted at 1300° C., the melt afterwards poured in water and the resulting shot ground with the necessary quantities of clay. The dross is, if desired, mixed with pigments for the manufacture of colored glazes, then applied to stoneware, ceramic of various kinds, tiles, wall plates, ceramic articles and the like and fired at SK 05*a*. A perfect good flowing out glaze is obtained which meets all requirements.

WILHELM DIETHER.

Published May 11, 1943 Serial No. 376,678

ALIEN PROPERTY CUSTODIAN

INJECTORS WITH ELECTRO-MAGNETIC CONTROL FOR INTERNAL COMBUSTION ENGINES

Ottavio Fuscaldo, Milan, Italy; vested in the Alien Property Custodian

Application filed January 30, 1941

The present invention concerns some improvements in injectors with electro-magnetic control for internal combustion engines, and the object of it are improvements in some parts of the injector for internal combustion engines which are particularly subjected to friction and percussion.

In the specification of the application Serial N. 305 419, the necessity is established for the friction and percussion surfaces to be very hard. As an easy solution the rule was indicated of hardening the percussion surfaces of the armatures by means of chrome application after rolling. Such hardening has been shown to be insufficient in practice particularly for the injectors operating at very high frequency: the iron under the chromium pulls and the chromium peels off.

This invention indicates a better solution, which is always an example and which will be clearly seen from following specifications referring to the annexed drawing where the figure represents with details, the zone of the injector concerning the parts of the armatures.

In accordance with the improvement, the percussion surfaces are no longer those of the soft iron armature **5***a* and **4***a*, but those of two central hardened steel pivots **9***a* and **51**, the first being an integral part of the valve rod already existing whereas the second is fixed in the plug **25***a* applied to the fixed armature **4***a*.

The dimensions are such that the play **7***a* between the loose armature **5***a* and the fixed armature **4***a* is more than the play between the pivot **9***a* and pivot **51**, to the extent of a few hundredth parts of a millimeter, so that when the valve is open and **9***a* and **51** touch each other, the parts **5***a* and **4***a* are found to be very near without touching however.

The material (iron) of **51** is fixed to the material (non magnetic iron) of **25** by forcing and soft welding if necessary, so that it is magnetically insulated from the material of **4***a*.

The iron of **9***a* is already magnetically insulated from the iron of **5***a*. It is of course understood that the particulars of execution can be varied without coming out of the dominion of the invention patent.

OTTAVIO FUSCALDO.

[illegible]

[illegible]

[illegible]

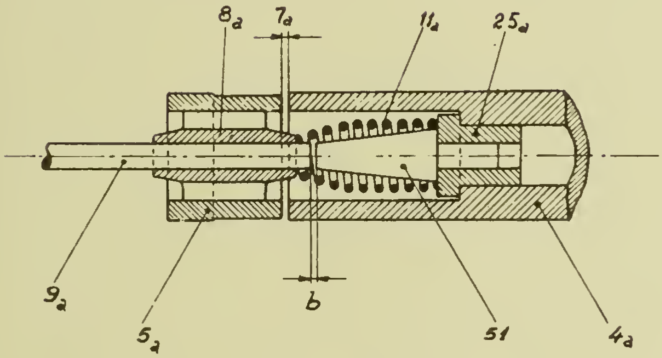
PUBLISHED

MAY 11, 1943.

BY A. P. C.

O. FUSCALDO
INJECTORS WITH ELECTRO-MAGNETIC CONTROL
FOR INTERNAL COMBUSTION ENGINES
Filed Jan. 30, 1941

Serial No.
376,678



OTTAVIO FUSCALDO,
Inventor

by Morrison, Kennedy & Campbell
Attorneys.

Published May 11, 1943 Serial No. 376,679

ALIEN PROPERTY CUSTODIAN

DEVICE FOR OBTAINING AUTOMATICALLY THE PROPER FUEL-AIR MIXTURE UNDER ALL CONDITIONS OF OPERATION OF INTERNAL COMBUSTION ENGINES FITTED WITH ELECTROMAGNETIC INJECTION

Ottavio Fuscaldo, Milan, Italy; vested in the Alien Property Custodian

Application filed January 30, 1941

The present invention concerns a device for obtaining automatically the proper fuel-air mixture under all conditions of operation of internal combustion engines fitted with electromagnetic injection.

The object of the present invention is the achievement of an innovation as disclosed by the following specification, with reference to the attached drawing given as an example and pure indication, limitating in no way the range of the invention.

The single figure shows diagrammatically the device with some of its parts in action.

In the drawing the supercharger **30**, draws in air from conduit **31** and delivers it to pipe **33**, feeding the various cylinders of the engine. In the suction-conduit **31** is a throttle **34**, controlling the air-admission, which throttle, by means of lever **35** and the yieldable pull-rod **36—37** is hand-controlled through lever **38**, fulcrumed in **39**.

In the same conduit **31**, there is also a second throttle **40**, limiting the air-feed, up to a certain altitude at which the full power of the engine is reestablished: said throttle is controlled through lever **41** and the pull-rod **42** by the limiting device **43**.

The pull-rod **36—37** is yieldable, being yieldably shortened on compression of spring **44**, when the nose **45** fouls the adjustable stop **46**, corresponding to full-open throttle **34**: it cannot however lengthen more than allowed by the end **47** of the casing **48** enclosing the spring.

The limiter **43** is of any known type with manometric vacuum-bellows **49** enclosed in a tight chamber **50**, wherein operates the absolute air feeding pressure prevailing in the supercharger, to which it is connected by means of pipe **51**, the limiter can be or not be provided with an hydraulic servomotor.

The bellow **49** is not fixed, but held by spring **53** against the inner face of guide **54** of the stem **55** of said bellows; the position being adjusted so that the hand lever **38** has completely opened throttle **34**, the pull-rod **36—37** begins to shorten, due to the stop **46**; the screw **56** of lever **38** moves the stem **55** of bellows, compressing spring **53** and the throttle **40** opens further, thus allowing a certain supercharging of air (for instance at take-off).

The electric current distributor **14** to the various injectors of the engine (fed by battery **15** when the switch **16** is closed) is of the type with variable length-of-time of contact, said variation being controlled by a centrifugal regulator **17** through pull-rod **18** and lever **19** as in the specification Serial N. 315,734.

The centrifugal regulator **17** (or any other device, either mechanical, hydraulic or air-driven etc. sensitive to speed changes) has the object of keeping within convenient limits the fuel-pressure in relation to the changes in the speed of the engine, namely to prevent it to increase too much at high speeds. This is obtained by letting the regulator control the device adjusting the "angular" length-of-time of the injection, if in any particular case it should be desired to keep the fuel-pressure constant, it will be sufficient to keep constant "relatively to time" and by means of said regulator, and at all speeds, the length-of-time of the injection (by maintaining the angular length of time proportional to speed); this owing to the direct ratio existing between the engine's speed and the fuel-volume fed by the pump per unit of time.

The volumetric pump **5** draws in the fuel from tank **7** by means of pipe **8** and feeds it under pressure to the injectors by means of pipe **9**.

An automatic correcting device maintains the proper fuel-air ratio in relation to the feed pressure air, independently of the characteristics and speed of the pump.

It consists in a vacuum manometric bellows **60**, placed in chamber **61** wherein, by means of pipe **62** and **62'** connecting it with the pressure pipes of the supercharger (or with the air intake conduit, when the engine has no supercharge) there prevails at every instant the absolute feed-pressure. The shifts (induced by bellows **60** with its variation in length) on the tapering part **63** of piston **64**, by-pass more or less fuel, through pipe **65**.

Another system of bellows **68**, within chamber **69**, with a piston **70** and its conical end **71**, is placed in parallel with the preceding, by means of pipes **73—74** and **75**.

In the system, chamber **69** communicates with the outer atmosphere through hole **76**. Its object is that of allowing a proper air-feed-adjustment of the engine, provided with superchargers, from the ground up to the prescribed altitude at which the full power of the engine is reestablished (this is the case for engines having to operate at given altitudes).

In conclusion, the set of devices for adjusting the fuel-air-ratio of the feeding mixture, consists substantially in two systems of manometric bellows, both under vacuum, inserted in parallel on the fuel by-pass; with their variation in length, said bellows obtain each one for itself, that the passage of the fuel be varied, by the motion of the piston with tapering end before its seat.

Of these two devices, the first operates under

influence of the feed-pressure of the engine, limiting or respectively increasing the section of passage of the fuel, according to the increase or decrease of fuel-pressure, the second operates under atmospheric pressure so as to limit or increase the section of passage according to the increase or decrease of outer air pressure.

The combination of the two manometric bellows allows the air-fuel ratio to be kept practically constant, whatever be the operating conditions of the engines.

It should be understood that the details of manufacture and of application might vary in practice without thereby exceeding the limits of the invention.

OTTAVIO FUSCALDO.

PUBLISHED

MAY 11, 1943.

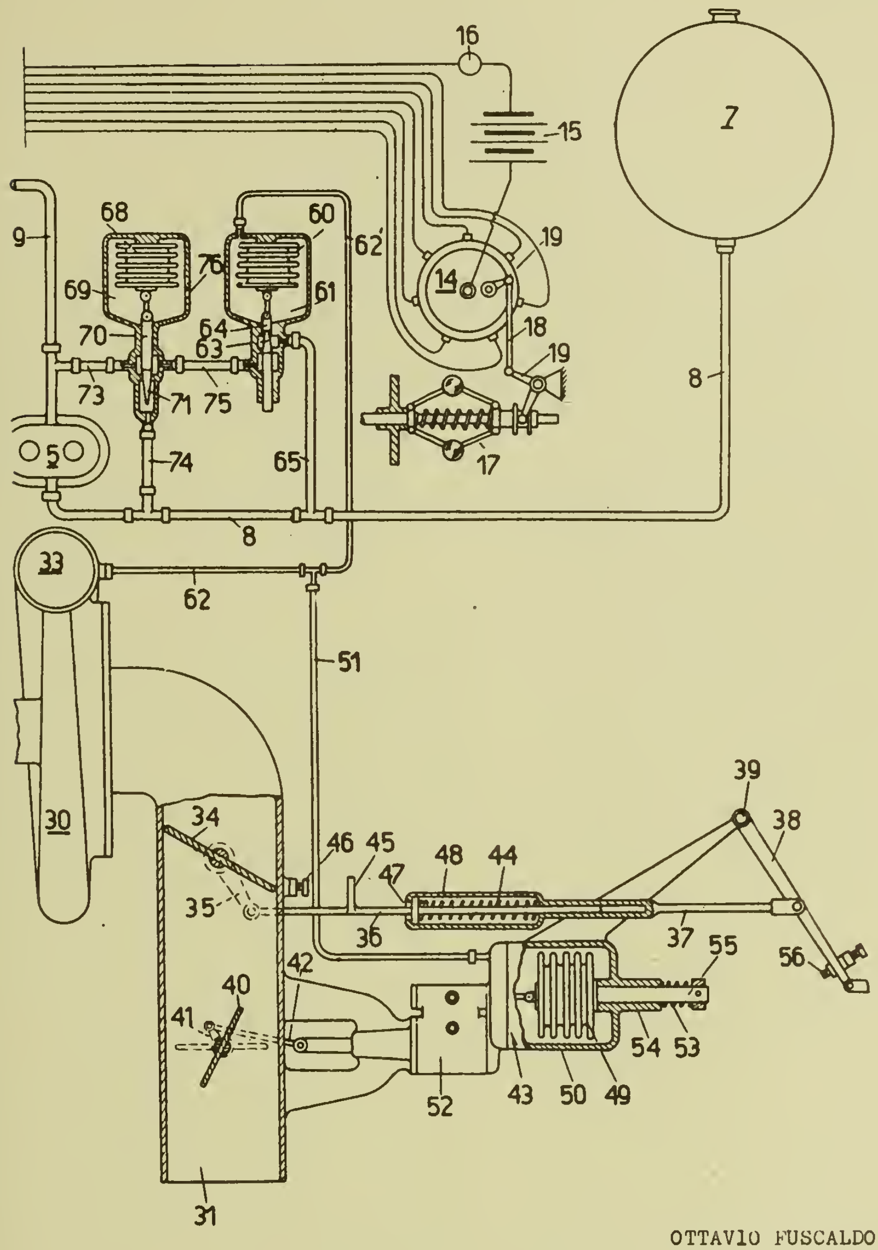
BY A. P. C.

O. FUSCALDO

DEVICE FOR OBTAINING AUTOMATICALLY THE PROPER FUEL-AIR MIXTURE UNDER ALL CONDITIONS OF OPERATION OF INTERNAL COMBUSTION ENGINES FITTED WITH ELECTROMAGNETIC INJECTION

Filed Jan. 30, 1941

Serial No. 376,679



OTTAVIO FUSCALDO,

Inventor

by

Morrison, Kennedy & Campbell

Attorneys.

Published May 11, 1943

Serial No. 377,047

ALIEN PROPERTY CUSTODIAN

ALUMINIUM ALLOYS

Gaston Gauthier, Chambery (Savoie), France; vested in the Alien Property Custodian

No Drawing. Application February 1, 1941

Aluminium alloys containing, as main added elements, zinc, magnesium and copper, are well known; they have been much studied, as their characteristics are relatively high, although in fact, only slightly superior to those of Al-Zn alloys of high Zn content.

The extremely surprising fact has been noticed that the addition of small quantities of chromium has the effect of raising in quite an unexpected manner, the mechanical characteristics of said alloys. An addition comprised between 0.01 and 2% is sufficient. This proportion obviously depends on the contents of the alloy in other constituents. These contents can be the following:

Zn up to 15%
Mg from 1.5 to 7%
Cu up to 5%
Ni up to 3%
Al=substantially the remainder.

By Al=substantially the remainder, it must be understood that the alloy inevitably contains the impurities, impossible to avoid, which technical metallurgical products always contain, even when, eventually, they have been chosen amongst the most pure.

The addition of chromium can be effected by any of the usual technical means, such as, by way of example: by addition of the metal itself, of an aluminium-chromium mother alloy, or of a mother alloy the main ingredient of which is aluminium containing, in addition to chromium, other constituents of the alloy, or again a chromium alloy with one or more of the other constituents. The chromium or some of the other constituents can also be added in the form of salts from which the chromium is freed by double reaction with the liquid metal bath.

To the alloys according to the invention can, of course, be added the known additional elements for refining the grain and facilitating the plastic distortions, such as Zr, V, Ti.

Likewise, use can also be made, for these alloys, of casting processes or specially known ingot moulds for avoiding or diminishing the importance of the segregations.

The alloys can be used after heat treatment consisting in completely or partially dissolving them by a heating operation the duration of which depends, as is well known, on the structure and composition of the alloy, and the temperature of which is comprised between 350° C. and the temperature at which melting begins; this heating is followed by a sudden cooling in the open air, in oil or in water. This treatment can be completed by a precipitation treatment effected by heating at a temperature which can be raised from the surrounding temperature up to about 400° C., and the duration of which varies according to the degree of mechanical resistance desired.

The addition of chromium must be carefully proportioned to the composition of the alloy. By way of example, the following compositions can be cited:

Example 1.—The alloy contains: Mg 2.5%—Zn 8.4%—Cu 1.5%—Cr 0.4%. It is rolled into sheets 1 m/m thick, by hot rolling, then by cold rolling. These sheets are heated to 460° C. for two hours, then quenched in water. They have the following characteristics:

Tensile strength: 46 kg/mm^2—Elastic limit: 29.5—Elongation 9.5—Brinnell number: 94.

The same alloy, after a precipitation treatment at 125° C for 10 hours, showed:

Tensile strength: 73 kg/mm^2—Elastic limit: 69—Elongation: 5—Brinnell number: 170.

Example 2.—The alloy contains: Mg 1.9%—Zn 8%—Cu 1.5%—Cr 0.25%. It is extruded in the press into round bars, rendered homogeneous by heating at 460° C. for two hours, then quenched in water. It has the following characteristics:

Tensile strength: 47 kg/mm^2—Elastic limit: 31—Elongation: 14.

The same alloy after precipitation treatment at 125° C. for 10 hours, showed:

Tensile strength: 65.4—Elastic limit: 61—Elongation 9.5.

Example 3.—The alloy contains Mg 2.5%—Zn 8%—Cr 0.5%. It is extruded in the press into round bars, rendered homogeneous by heating at 460° C. for two hours, then quenched in water. It presents the following characteristics:

Tensile strength: 42.3—Elastic limit: 28.4—Elongation: 11.5—Brinnell number: 126.

The same alloy, after precipitation treatment at 125° C. for 10 hours, showed:

Tensile strength: 66.1—Elastic limit: 65—Elongation: 5.7—Brinell number: 164.

GASTON GAUTHIER.

Published May 11, 1943

Serial No. 377,371

ALIEN PROPERTY CUSTODIAN

NON-SKID DEVICE

Fritz Hetz, Ettlingen/Baden, Germany; vested in the Alien Property Custodian

Application filed February 4, 1941

This invention relates to non-skid devices for the tires of motor vehicles, of the type to be additionally applied to the tires to prevent skidding, especially in case of snow and ice on the road.

It is an important object of the present invention to provide a non-skid device which gives maximum friction and grip on the road.

A special object of the invention is to provide a non-skid device which is adapted to prevent the jerks and jolting movements occurring on slippy roads especially when starting, where the conventional non-skid chains with rubber shoes and are used.

With these and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawings, but includes further structures coming within the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its structural forms, as illustrated by the accompanying drawings in which:

Fig. 1 is a plan view of a shoe element for a non-skid device, having the invention applied thereto,

Fig. 2 is a side view of Fig. 1,

Fig. 3 is an end view of Fig. 1,

Fig. 4 is a section on line A—B of Fig. 1,

Fig. 5 is a side view of a tire provided with my novel non-skid device, on a smaller scale, and

Fig. 6 is a fragmentary cross sectional view on line E—F of Fig. 5, on a somewhat larger scale, but showing a modified mounting method. Both in Fig. 5 and 6 the shoe elements are indicated schematically only.

Referring now to the drawings in greater detail, and first to Fig. 5, it will be observed that the tire G of the motor car wheel H is fitted with a non-skid chain comprising a plurality of rubber strips or shoes K lying across the tire as best seen from Fig. 6, and secured to a chain L by means of U-shaped members M of steel wire or other suitable material engaged through end holes N (Fig. 6) in the rubber strips and connected to the chain L in any suitable manner. It will be understood that in the construction shown in Fig. 5 another chain L and another series of U-members M have to be arranged on the rear side of the wheel. Both chains L may be provided with a chain lock as indicated at O in Fig. 5, but in many instances it will be satisfactory to provide a chain lock on one side only, applying the non-skid device onto the wheel from the outer side of the wheel and then connecting the chain lock at the inner side of the wheel. The chain lock may be in the form of any suitable device adapted to connect and disconnect the free chain ends and to tighten the chain.

Referring now to Figs. 1 to 4, showing a single shoe element, it will be seen that the shoe element is provided with a plurality of steps and edges C in the form of stairs extending in its longitudinal direction, i. e., at right angles to the direction of motion of the vehicle, whereby an increased gripping effect is achieved. I have found that the gripping effect of the non-skid device is considerably enhanced by the fact that a plurality of gripping edges C are created in accordance with my invention which are coming into action on the ground at the same time. Thus, jolting is avoided, especially when starting, and smooth, safe driving is ensured on snow, ice, slippery country roads and on ploughland. Also the jerks resulting, especially when starting with the use of the conventional shoe members having one active edge only, are smoothed down.

As best shown in Figs. 1 and 2, the shoe element which preferably consists of soft rubber, of the type used for rubber tires, is formed of a basic strip portion P having end lugs Q which are formed with holes R, a second strip portion S of smaller width and length, and a plurality of small prismatic portions T, U, W, on said second strip portion S. Moreover, the end lugs Q of strip P are recessed to form steps and edges D. The strip P, and the portions T, U, W, are arranged to recede from the edges of the basic strip P, or of the strip portion S, respectively, in such a manner that in addition to the transverse steps and edges C, further steps and edges D are formed in the longitudinal direction or direction of motion of the vehicle, whereby lateral skidding and side slipping of the vehicle is safely prevented and the vehicle is reliably kept in the track.

The steps or stairs are suitably made with sharp edges C and D but it will be understood that the edges may show some rounding off such as will result due to wear and tear during practical use of the device, without departing from the scope of the invention, the main feature of my invention residing in the fact that a plurality of consecutive steps is provided on each element, offering a plurality of attacking and supporting surfaces.

According to a further feature of the invention, some of the blocks or prismatic portions T, U, W,

may be made with top surfaces rising towards the ends of the strip, as indicated at X, whereby the number of edges acting against side slip is further increased. Also, to a certain extent this will make up for the bending of the shoe member around the tire (Fig. 6) which of course tends to reduce the gripping effect of the outer edges D.

Referring now to Fig. 6 in greater detail, it will be noted that in this case a single non-skid shoe K is secured to the wheel by means of a strap Y connected to bore N of lug Q in any suitable manner and placed around the rim of the wheel, a buckle Z serving for tightening shoe K.

If desired, a single non-skid shoe K according to Fig. 6 may be attached to one or more wheels of the vehicle, but it is also possible to secure a plurality of such shoes on each wheel to meet special conditions.

It will be understood that the portions S, T, U, W, of the shoe K constitute an integral body together with the basic strip P, said integral body being made in any suitable manner, e. g. by molding. If desired, other materials such as, leather or metal may be used in place of rubber for making the shoes K.

The apparatus of the present invention has been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing. Especially the shoe members may be shaped in a manner different from the drawings, provided only that a plurality of steps and edges are created for the purpose set forth.

FRITZ HETZ.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. HETZ
NON-SKID DEVICE
Filed Feb. 4, 1941

Serial No.
377,371
2 Sheets-Sheet 1

Fig. 1

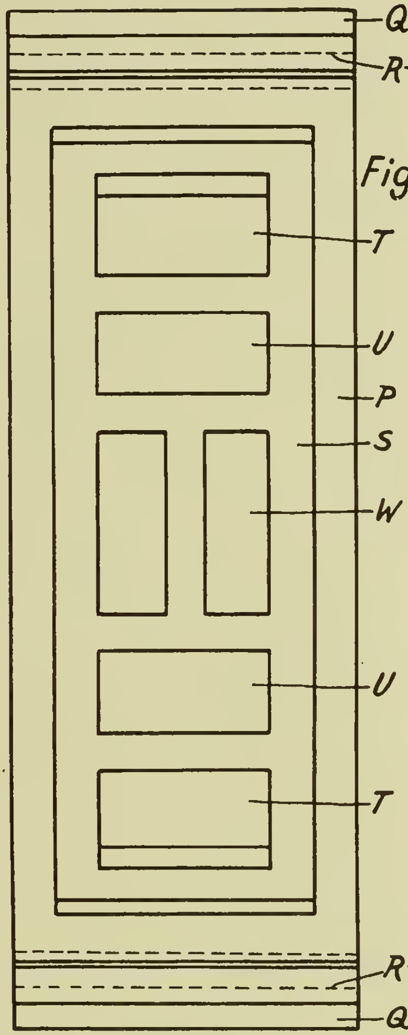


Fig. 2

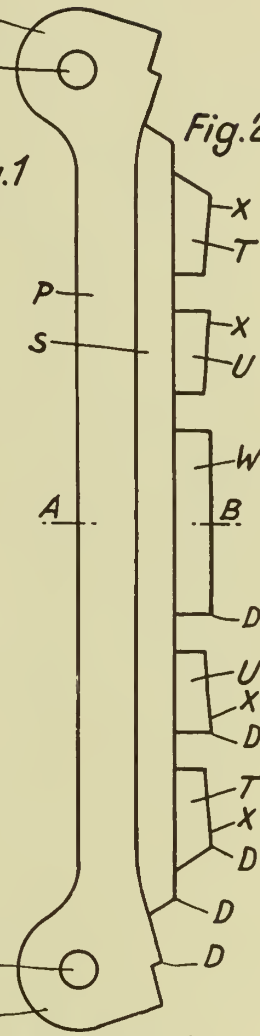


Fig. 3

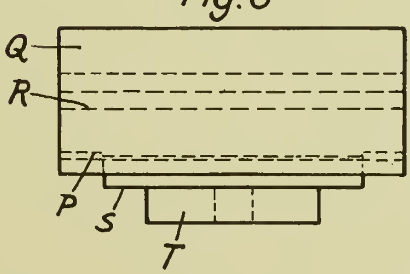
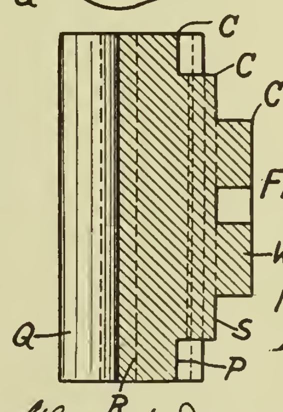


Fig. 4



Inventor:
F. Hetz

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. HETZ
NON-SKID DEVICE
Filed Feb. 4, 1941

Serial No.
377,371
2 Sheets-Sheet 2

Fig. 5

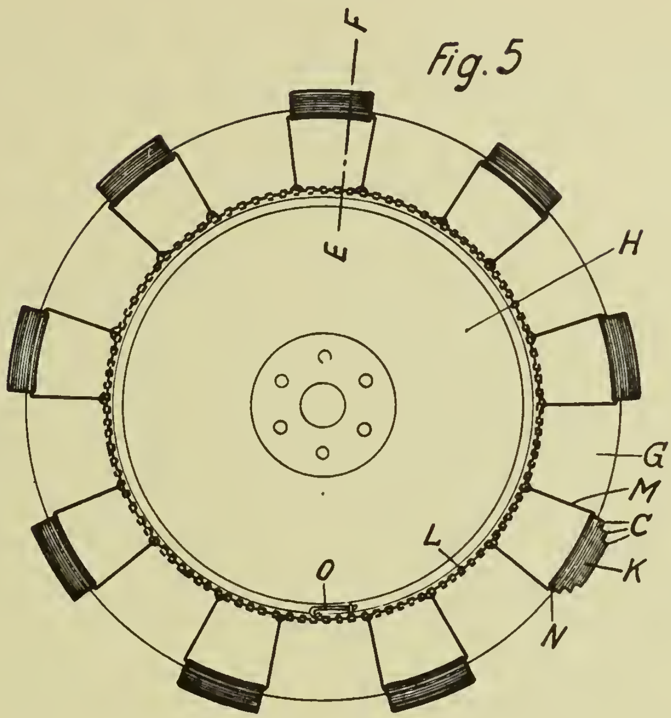
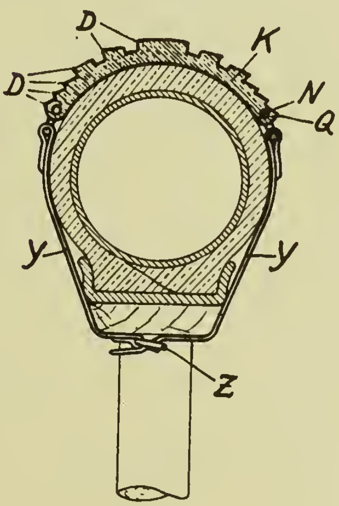


Fig. 6



Inventor:
F. Hetz

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 377,575

ALIEN PROPERTY CUSTODIAN

FOUNTAIN PEN

G. Károly Bodó, Budapest, Hungary; vested in the Alien Property Custodian

Application filed February 5, 1941

The invention relates to a fountain pen according to my prior Patent No. 2,198,756 which enables the air accumulated in the ink reservoir of the fountain pen to be expelled. My prior patent refers moreover, to a device intended to ensure that no bubbling and consequent splashing of the ink should be caused by the air expelled. This aim is achieved by means of a tubular extension joining on to the edge of the air opening provided at the end of the slot of the nib. Although this device substantially reduces the danger of any bubbling and splashing of the ink, it will nevertheless not eliminate this danger completely and under all circumstances, whilst, moreover, it also renders the manufacture of the nib more difficult.

As against this, the invention enables any splashing of the ink due to bubbling to be prevented with absolute certainty, this purpose being achieved without any alteration of the usual construction of the nib or with a so slight alteration only of its construction as will not increase the cost of its manufacture.

The novelty of the fountain pen according to the invention consists in that the ink-spoon duct possesses a lateral branch the point of outlet whereof is situated inside the ink collecting funnel surrounding the nib.

In the accompanying drawing, various embodiments of the device according to the invention are represented by way of example.

Fig. 1 is a longitudinal section of one embodiment of the invention, whilst Fig. 2 is a cross-section along line **2**—**2** of Fig. 1.

Fig. 3 is a longitudinal section of another embodiment, whilst Fig. 4 is a cross-section along line **4**—**4** of Fig. 3.

Figs. 5 and 6 are two variants of the embodiment represented on Fig. 3.

In Figs. 1 and 2, **10** is the nib and **15** is the ink-spoon duct, the latter also serving for the admission of the air entering the interior of the fountain pen in order to replace the ink consumed by writing; **17** is the ink-collecting funnel, which is of slightly greater depth than usual. According to the invention, the lateral duct **16** having its point of outlet preferably immediately above the bottom of the ink-collecting funnel **17** branches out from the ink-spoon duct **15**. This lateral duct is constituted in the embodiment shown on Figs. 1 and 2 by a hole drilled into the nib, the said hole being similar to the air opening **12** usually provided on nibs but being situated nearer to the root of the nib than the last-named opening; it is only down to the opening **12** that the slot of the nib extends.

It is not only on the nib itself, however, that the lateral branch of the ink-spoon duct can be provided: it may also be arranged so as to pass through the ink-spoon, as shown on Figs. 3 and 4, according to which the lateral duct **19** branches out from the ink-spoon duct **15** and its outlet orifice is situated, in the vicinity of the bottom of the ink-collecting funnel **17**, on that side of the ink-spoon **18** which is opposite to the nib **10**.

Fig. 5 represents such an embodiment of the device according to Figs. 3 and 4 in which the lateral duct **19** divides into two branches the points of outlet whereof are situated on the two sides of the ink-spoon near the edges of the nib.

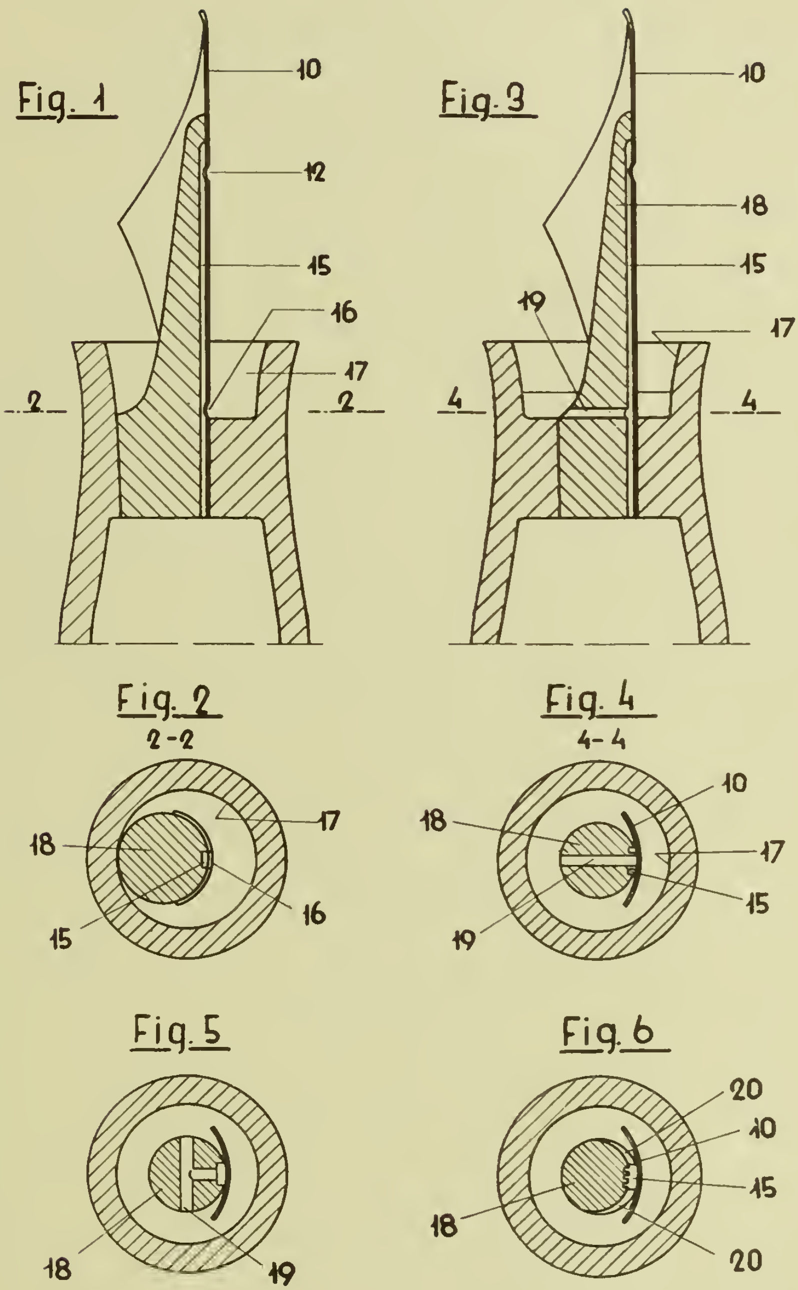
According to Fig. 6 it is the grooves **20** recessed into the surface of the ink-spoon **18** and branching out from the ink-spoon duct **15** that constitute the lateral ducts, which in this case are situated between the nib **10** and the ink-spoon.

G. KÁROLY BODÓ.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

K. BODO
FOUNTAIN PEN
Filed Feb. 5, 1941

Serial No.
377,575



Inventor:
G. Károly Bodó
By E. F. Wendroth atty

Published May 11, 1943

Serial No. 377,912

ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR APPLYING HAIR PINS TO THE HAIR FOR THE PURPOSE OF CURLING WAVING OR DRESSING THE HAIR IN GENERAL

Giovanni Rossi, Milan, Italy; vested in the Alien Property Custodian

Application filed February 7, 1941

The subject matter of this invention is a method and the respective apparatus for applying hair pins to the hair for the purpose of curling, waving or dressing the hair in general.

There are apparatuses for waving the hair by rolling it, but they are not found to be perfect while their use is tiresome and long, and they may tear the hair out or do harm to it while they are being used. Furthermore, the application of hair pins to a tuft of rolled hair takes place by hand and is found to be very bothersome and not rational. This causes the curl dressing to lose shape and often breaks the nails caused by the necessary effort for opening the hair pins and gives rise to other trouble.

This invention does away with the aforesaid troubles and the apparatus is easy to use, with simple and quick handling.

The method according to the invention, is characterized by the fact that to a suitable folded tuft of hair springed hair pin or the like, with means for support and running is applied.

The apparatus for carrying into the effect the method now defined is characterized by the fact that it comprises, beside engaging means for the hair, means of engaging for a springed hair pin, or the like, fast with running means, support and guide means for the hair pin and automatic means to disengage the said hair pin from the running and guide means after it has been engaged with a tuft of hair.

Eventually and advantageously the apparatus for applying the hair pins to the tuft of hair can provide in combination suitable means to wave or curl the hair.

In a preferred embodiment, the apparatus comprises a rod, of metal by preference, at the end of which there are engaging means for the hair to be waved or curled, a sleeve or the like running on the said rod, provided with springed means to hold a hair pin or the like, means to help to disengage the waved or curled hair and to avoid wedging the hair in with the running sleeve, the manoeuvre of the latter putting the hair pin in the tuft of hair and freeing it from the waving or curling means as well as automatic disengagement of the hair pin from the springed or rigid means.

The apparatus, if required, can incorporate means for heating the rod, of the electric type for instance, or it can be combined with a comb or another utensil. The hair pin engaging with the hair can be of any type; it can advantageously consist of an elastic wire, metallic for instance, suitably shaped, bent and with one of its ends rounded and shaped in such a way as to help it to go in the tuft of hair and to keep the latter in the inside part of the hair pin without any chance of the hair getting loose.

The foregoing and other features of the invention will be seen from the following specification which refers to the annexed drawing, which is only given as an indicative example without limiting the range of the invention in any way.

Fig. 1 is a view of the apparatus with the hair wound on the hair pin and ready to be untwisted.

Fig. 2 is a part lengthwise section of the apparatus.

Fig. 3 is a plan view of the end.

Figs. 4 and 5 are sections on lines 4—4 and 5—5 of Fig. 2 without the hair pin.

Fig. 6 is a raised view of the preferred form of execution of a hair pin.

With reference to Figures 1 to 5, the apparatus comprises a handle A provided with a rod B of any section and a movable sleeve C running on the latter.

Rod B of the metallic type, but which can be made with other materials such as synthetic resins for instance, has a lengthwise slot 10 at its end, of a suitable length in which the tuft of hair to be waved or curled is threaded. The aforesaid slot gets wider towards the end of the rod to help threading in the hair, said threading being further made easy by the convenient asimmetric shape of the rod ends which has rounded borders to prevent the hair breaking as well as to help unwinding and winding the hair.

In the lengthwise direction rod B has a first hollow 11 of a size to receive, as will be mentioned hereinafter, a hair pin F and it terminates freely at end 12; this end is shorter than the other to allow an easier threading of the hair and make the hair pin F can disengage automatically from hollow 11. The aforesaid end can be blunted and reduced in size. There is a second hollow 13 diametrically opposite hollow 11 which finishes in correspondence with the end of rod B with a projection 14 that acts as a stop device for sleeve C by preventing it from unwinding. Catches 15 in one with sleeve C, with blunted or rounded corner angles, engage in hollows 11 and 13. The said catches are solid with the sleeve C; but they can be made separately and then connected with the sleeve. The purpose of the catches is to guide the sleeve and to make the tuft of hair wound on rod B unwind without allowing the said hair to entangle with the

movable sleeve and hence break. To furthermore avoid having the hair entangle with sleeve C, the latter does not adhere to rod B but has a ring hollow **25**, whereas the said sleeve has size reductions **26** (Fig. 3) not absolutely necessary, which prevent, when the sleeve is operated, the hair from being entangled among the running parts. The hair is unwound from rod B by the catches **15** which keep sleeve C centered to the rod, serving as a guide for the same, as has been said.

The bottom catch furthermore stops the sleeve against projection **14**, and if rod B is of a round section, it prevents the sleeve from revolting. In correspondence with hollow **11**, sleeve C has an appendix **16** of loop bent metal wire and shaped in such a way as to hold hair pin F at the upper end **17** so that the latter is in one with sleeve C. Appendix **16** is fixed in such a way as to allow it to be as elastic as possible in regard to its free length; with this end in view it is fixed at the opposite end of sleeve C and a hollow **16′** is made in its anterior part. The springed tract of appendix **16** is lengthened. This is foreseen in such a way as to be able to efficiently use all the length of the hair pin without causing trouble for the fixing of same to the sleeve said sleeve keeping the pin obliged in the cavity of the rod. With reference to Fig. 6, the hair pin F is realized by flattering its ends **18** and **19** and bending back one of the aforesaid ends in such a way as to form a marked bend **20**. At the back the said hair pin ends in a widened part **17** which is closed elastically in the other end **23**, widened too, of bend **20** even when the hair pin is engaged with a considerable quantity of hair, thus preventing the hair from getting free. Owing to its shape, bend **20** allows the hair pin to thread through the hair without tearing it and its point **21** can be suitably rounded to avoid scratching or hurting the skin when hair pin F is put in correspondence with the roots of the hair. The aforesaid hair pin can have known bends or waves **22**.

The apparatus is used as follows: when sleeve C is at the bottom of rod B, a hair pin F, preferably of the type illustrated, engages in appendix **16**; it will be kept back automatically owing to its depression **24** when the said sleeve is sent back. The hair to be curled is combed in the required way and by keeping it stretched by hand, it engages with slot **10** of rod B and is wound on it.

Then sleeve C is moved in such a way as to thread hair pin F on the lock; then rod B is pulled and the said sleeve is kept still so that the curl with the hair pin comes off the rod. Automatically hair pin F too disengages from appendix **16** to be arrived to the end of the reduced part **12** and of the cavity **11**.

For waving operations take place as above, but winding of the hair on rod B is confined to three quarters of a turn or about this, and then the operation in question is started near to the roots of the hair and it can be repeated several times to obtain the required wave on the same lock of hair.

The time for waving the hair with the hair pins can be reduced considerably by heating slot **10** suitably. The apparatus can be completed with heating means of the electrical type or another for rod B and the handle A can likewise be replaced with a comb or another suitable device. Although only one way of making the apparatus, and the hair pins an accomplished fact has been illustrated, in practice these can undergo variations of execution and accomplishment which all enter into the field of the invention.

GIOVANNI ROSSI.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

G. ROSSI

METHOD AND APPARATUS FOR APPLYING HAIR PINS TO THE HAIR FOR THE PURPOSE OF CURLING WAVING OR DRESSING THE HAIR IN GENERAL

Filed Feb. 7, 1941

Serial No.
377,912

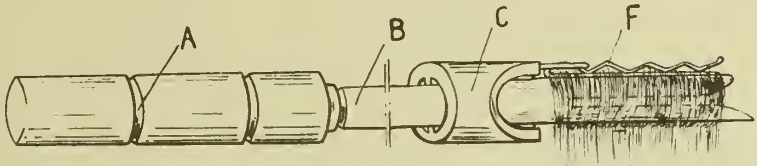


FIG.1.

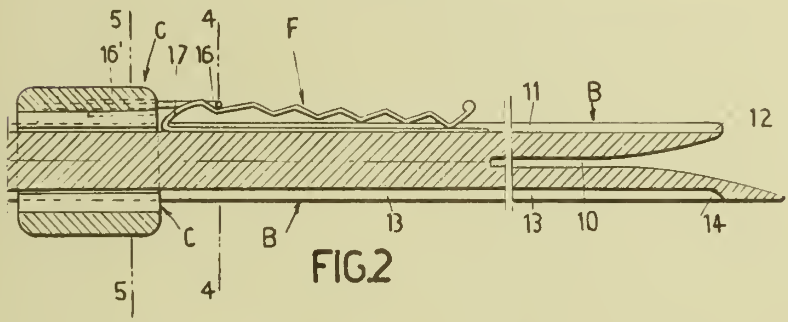


FIG.2

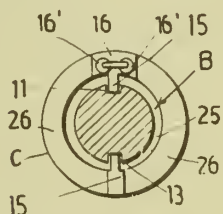


FIG.3

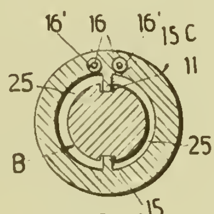


FIG.4

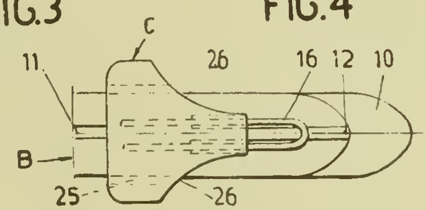


FIG.5

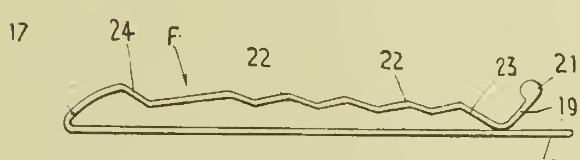


FIG. 6

Inventor
Giovanni Rossi
by Sommers-Young
Attorneys

Published May 11, 1943 Serial No. 378,045

ALIEN PROPERTY CUSTODIAN

DRIVER'S SEAT ESPECIALLY FOR TRACTORS AND AGRICULTURAL MACHINES

Anton Lentz, Heidelberg, Germany; vested in the Alien Property Custodian

Application filed February 8, 1941

This invention relates to a driver's seat, especially for tractors and agricultural machines. The object of the invention is to arrange the seat on the vehicle so that it is possible to alter its position in a simple manner.

If a tractor is employed for cultivating of fields or of plants, that is for drillage and hoeing work, when it is material to conduct the implements accurately in the rows to be worked, the driver must alternately observe the course of both front wheels of the tractor. As, however, the driver's seat is, as a rule, arranged on the right hand side of the tractor and the position of the seat cannot be altered during the service, it is impossible for the driver to also observe from the seat the course of the left hand front wheel. The same is evidently valid also for the agricultural machines destined for the drillage of fields and the cultivation of plants when these machines are equipped with a driver's seat from which they are steered.

According to the invention the driver's seat is arranged on the tractor or on the agricultural machine so that it can be moved in lateral direction parallel to itself and be secured in its different positions, preferably however in the middle position and in the end positions. In this manner the position of the seat can be selected as required on the left hand side or on the right hand side or in the middle of the tractor, so that the driver during the work on the field can easily observe the course of both front wheels and conduct the tractor or the agricultural machine correctly in the rows to be worked. The seat is then preferably connected with the vehicle by means of a parallelogram-guide which is mounted so that it can oscillate about turning axles situated in the direction of movement of the tractor. This arrangement can be carried out so that the support for the seat is hingedly connected with two parallel links fixed the one below the other on the vehicle and oscillatable in lateral direction. By oscillating the links, which then form the parallelogram-guide together with the seat support, the position of the seat can be altered parallel to itself. The links are preferably oscillatable by 180°. In the middle position the seat is preferably secured by a foldable bolt mounted on the vehicle, and in the extreme positions by a stop provided on the vehicle and limiting the oscillating movements of the links. The construction of the links and of the bearings of the same and of the seat and of the seat support may be different.

In order to hold the links in the parallel position in any position of the seat, these links may be constructed as elbow levers according to the invention, and their bent off arms may be hingedly connected by a strap. In this manner two parallelogram-guides are formed mutually displaced at an angle, and the seat support forms with one arm of each of the links the one parallelogram-guide, and the bent off arms of the links with their connecting strap form the second parallelogram-guide. The links are then constructed or arranged so that always only the pair of links of one parallelogram-guide can be oscillated into the stretched position or into the dead point position, whereas the other parallelogram-guide serves for overcoming this stretched position. Hereby is avoided, that in the middle position of the seat, in which the links extend in one line with the support of the seat, one of the links oscillates from the stretched position towards the left and the other link towards the right, whereby an oblique position of the seat support and clamping of the parallel guiding would occur. By the additional parallelogram guiding the links are guided parallel also when the stretched position is exceeded.

The parallel position of the links may, however, be preserved in any position of the seat thereby that the parallel conducted links are fixed on the tractor or agricultural machine the one at the side of the other and connected by a coupling piece on which the seat support is fixed. In this arrangement it is not necessary that the links be oscillated into the stretched position, so that an additional parallelogram guiding of the links is not required. The arrangement is such that the links are in perpendicular position at the middle position of the seat and parallelly oscillated towards the side for altering the position of the seat. In the middle position the seat is secured by a foldable bolt mounted on the vehicle, whereas stops are provided on the links for securing the seat in the extreme positions, said stops limiting the oscillating movements of the links and striking then against abutments on the vehicle.

Three embodiments of the invention are illustrated by way of example in the accompanying drawing, in which Figs. 1 and 2 show the first embodiment, Figs. 3 to 5 the second embodiment, and Figs. 6 and 7 the third embodiment.

Fig. 1 is a side elevation and

Fig. 2 a rear elevation,

Figs. 3 and 4 are rear elevations of the different positions,

Fig. 5 is a top plan view of Fig. 4,

Fig. 6 is a side elevation and

Fig. 7 a rear elevation.

A rod **2** carrying the seat **1** is inserted into a seat support **3** consisting, for instance, of a tube, said rod **2** being supported relative to the seat support by means of a spring **4**. On the seat support **3**, connecting links **5** and **6** are provided, by means of which the seat support is hingedly connected with parallel links **7** and **8**. These links in turn are mounted on pivot pins **10** and **11** situated in the direction of travel and arranged the

one below the other on the body 9 of the tractor or on the frame of the agricultural machine. They form a parallelogram guiding together with the seat support 3, by means of which guiding the seat 1 can be brought by oscillation from the middle position shown in Fig. 2 in full lines into the left hand or right hand extreme position, indicated in Fig. 2 in dash dot lines. In the middle position the seat is secured by a bolt 12, which is foldable for instance, and mounted on the body 9 of the tractor or on the frame of the agricultural machine. The end of bolt 12 is fork-shaped and engages over the seat support 3. The bolt 12 bears then against stops 13 fixed at either side of link 7. By turning bolt 12 about its pivot point 14 into the position indicated in Fig. 1 in dash dot line, the links 7 and 8 can be oscillated towards the left or towards the right, until their stops 13 come to bear against an abutment 15 mounted on the body 9 or on the frame of the agricultural machine, by which abutment the seat is secured in its extreme positions. The longer the links 7 and 8 are, the greater is their oscillation and the farther can the seat be shifted towards the left or towards the right.

According to Figs. 3 to 5, the links 7 and 8 are constructed as elbow levers, and their branched off arms 16 or 17 are hingedly connected by a strap 18. The arms 16, 17 and the strap 18, same as the arms 7 and 8, form a parallelogram-guide with the seat support 3; the arms 16 and 17 and the strap 18 form further an additional-guide for the links 7 and 8. They do not only impart to the links 7 and 8 and to the seat support 3 a greater security against torsional stresses, but also prevent the links from oscillating in the stretched position in opposite direction. Fig. 3 shows the right hand extreme position of the seat, the arm 8 of the lower elbow 8, 17 striking onto the abutment 15 on the body 9. In this position the branched off arms 16 and 17, which in the form of construction shown are at right angles relative to the arms 7, 8, are in the stretched position. Fig. 4 shows the middle position of the seat or of its support 3, the arms 7 and 8 being in the stretched position, and the branched off arms 16 and 17 being correspondingly at right angles relative to the strap 18.

As shown in Figs. 6 and 7, the links 19 and 20 transmitting the lateral movements of the seat are mounted on the pivot pins 21 and 22 extending in the direction of travel and horizontally arranged the one at the side of the other on the body 9 of the tractor or on the frame of the agricultural machine. The pivot pins are connected by a connecting rod 23, on which the seat support 3 is fixed approximately at the middle. In the middle position of the seat or of the seat support 3 the links 19 and 20 are vertically mounted, the seat support being arranged between the pivot pins 21 and 22. The seat is secured in this position by a foldable bolt 12. For securing the seat or the support of the same in the extreme positions, stops 24 or 25 respectively, are provided on the links 19 and 20 and limit the oscillating movements of the links by striking onto the abutment 15 on the body 9 of the tractor. In this form of construction the stretched position of the links is avoided. The full lines in Fig. 7 show the right hand extreme position, the dash lines the left hand extreme position, and the mixed lines the middle position of the seat.

ANTON LENTZ.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. LENTZ

DRIVER'S SEAT ESPECIALLY FOR TRACTORS AND AGRICULTURAL MACHINES

Filed Feb. 8, 1941

Serial No. 378,045

3 Sheets-Sheet 1

Fig. 1

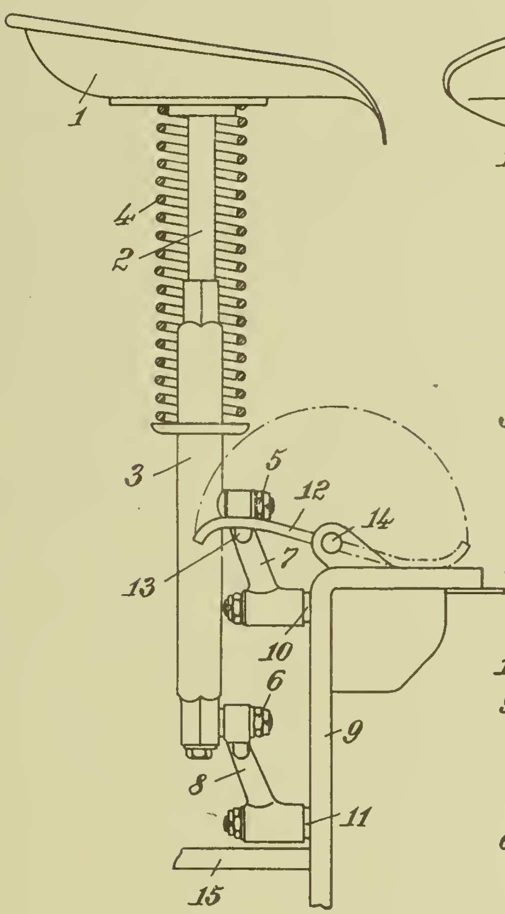
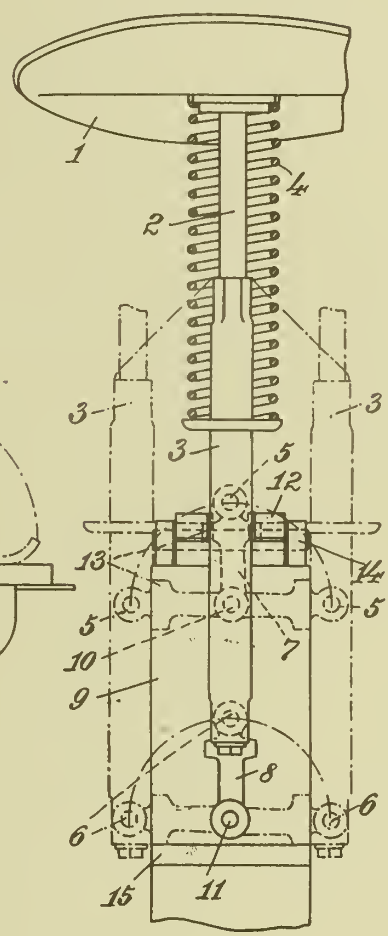


Fig. 2



Inventor:
Anton Lentz

per Karl A. Mayr
Attorney.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

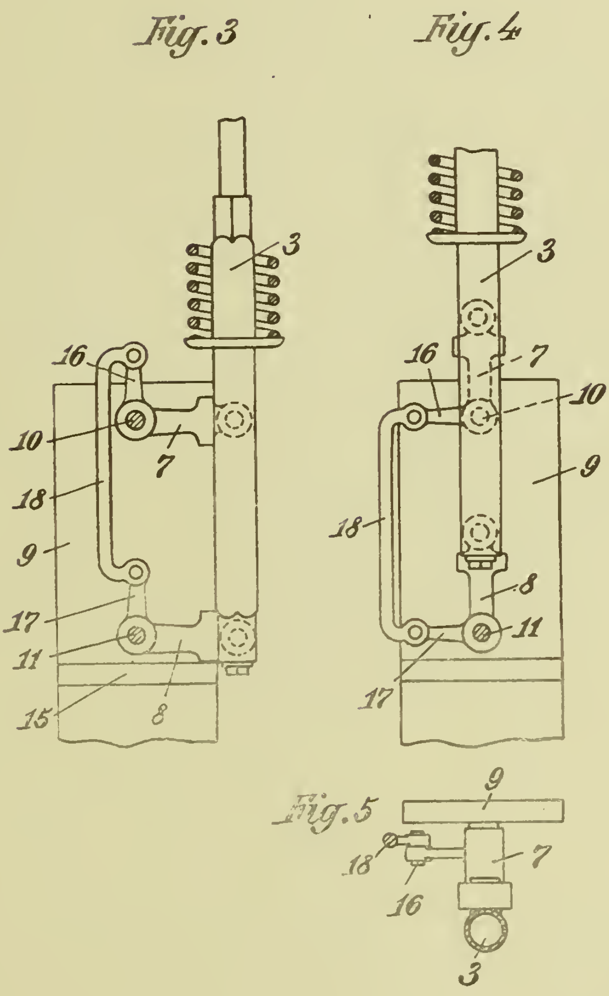
A. LENTZ

DRIVER'S SEAT ESPECIALLY FOR TRACTORS AND AGRICULTURAL MACHINES

Filed Feb. 8, 1941

Serial No. 378,045

3 Sheets-Sheet 2



Inventor:
Anton Lentz
per Karl A. Mayr
Attorney.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. LENTZ

DRIVER'S SEAT ESPECIALLY FOR TRACTORS AND AGRICULTURAL MACHINES

Filed Feb. 8, 1941

Serial No.

378,045

3 Sheets-Sheet 3

Fig. 6

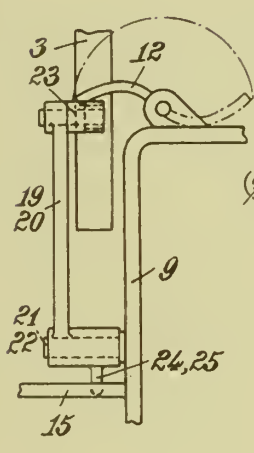
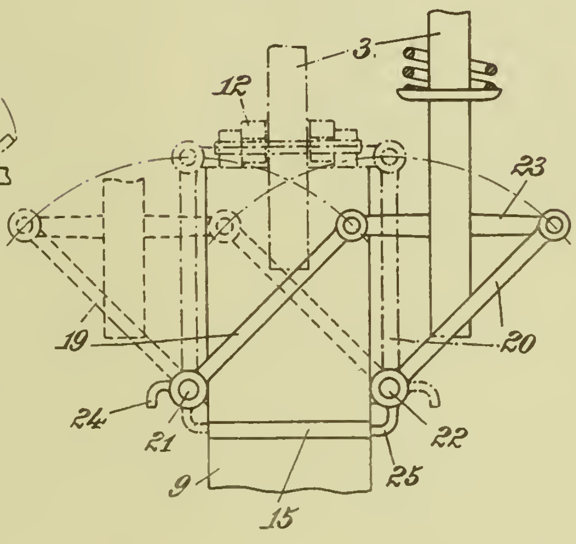


Fig. 7



Inventor:
Anton Lentz
per Karl A. Mayr
Attorney.

Published May 11, 1943 Serial No. 378,640

ALIEN PROPERTY CUSTODIAN

LUBRICATION DEVICES

Emile Loison, Paris, and Cesar Marchand, Nogent-sur-Marne, France; vested in the Alien Property Custodian

Application filed February 12, 1941

The present invention relates to lubrication devices and it is more especially, although not exclusively concerned, among these devices, with those for lubricating the parts, and especially the cylinders, of internal combustion engines.

The chief object of the present invention is to provide a device of this type which is better adapted to meet the requirements of practice than those used for the same purpose up to the present time.

According to an important feature of the present invention, concerning more especially the devices of this kind in which the lubricant is fed to the surfaces to be lubricated in the form of an emulsion, these devices are designed in such manner that the air intended to form the emulsion is introduced into the lubricant at a point located in the immediate vicinity of the reservoir containing said lubricant.

The emulsified matter is then preferably led, through suitable conduits, to a place where said matter can be examined, and eventually where its rate of flow can be adjusted, after which the emulsion is fed to the surfaces to be lubricated.

According to another feature of the invention, which relates to the case of internal combustion engines fed with "dry" fuels, such for instance as producer gas, town gas, alcohol, etc., the cylinders, or cylinder tops of these engines are lubricated by means of emulsion lubricating devices, and in particular devices of the kind above described.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a diagrammatic vertical sectional view of a lubricating apparatus of the type forming an oil emulsion to be used in an internal combustion engine, this apparatus being made according to the present invention;

Fig. 2 is an elevational view showing separately, on an enlarged scale, the means for examining and adjusting the composition of the emulsion, as included in the apparatus illustrated by Fig. 1, according to the invention;

Fig. 3 is a vertical sectional view corresponding to Fig. 2.

In the following description, it will be supposed that the invention is applied to the lubrication of an explosion engine for an automobile vehicle, and, more especially, that this engine is fed with a dry fuel, such for instance as producer gas, town gas, alcohol and so on.

Experience has taught that, in engines fed with such fuels, an abnormal wear of the cylinders and the valves takes place as a consequence of the nature of these fuels.

In order to avoid this drawback, according to the present invention, we provide, on this engine, a lubricating device of the oil emulsion type, such as was already utilized, in the case of engines fed with the usual fuels for obtaining a super-lubrication. Such a device, when used in connection with an engine fed with a dry fuel, plays a much more important part since it is necessary to prevent a wear which, as taught by experience, has proved to be very quick (streaks formed in the cylinders, pitting of the valves, and so on).

As for the particular arrangement of this lubrication device, it is preferable to make it as follows:

We provide, in the known manner, a reserve of oil in a container such as 1, which container is for instance mounted on the inside of the hood of the motor vehicle.

This container is connected, through at least one conduit, with a portion of the engine subjected to the suction produced during the inlet stroke of the pistons, for instance with the fuel intake conduit, according to an arrangement which is also known in itself.

As for the means for ensuring the formation of the emulsion, they are devised in such manner that the air necessary for this purpose, or at least a portion of this air, is introduced into the lubricant at a point in close proximity to this container.

For instance, according to an embodiment which seems to be advantageous, conduit **2** is partly immersed in the container. For instance, this conduit is in the form of a U-shaped tube in which is provided, on the one hand, at least one calibrated orifice **3**, for the inflow of oil for instance at the lower part of the U, and, on the other hand, at the end of said tube which projects upwardly from the surface of the liquid, a calibrated orifice **4**, for the inflow of air.

Of course, other air inlets may be provided at other places.

The orifices, such as **3** and **4**, may be adjustable, possibly from a distance.

With such an arrangement, under the effect of the suction produced by the engine, a mixture of air and oil, in substantially constant proportions, is formed in the apparatus and fed toward the engine. We may provide a device of the uni-

form level type capable of ensuring a constant static height of liquid acting on point **3**.

Of course, an air inlet is provided in the wall of the container, for instance at **13**.

On the other hand, means must be provided for adjusting the rate of flow of emulsified liquid fed to the engine.

These means are preferably carried by the instrument board **5** and they consist for instance essentially of a needle valve **6**, operated by means of a knob **7**, this needle valve controlling the outlet of conduit **2** into a chamber provided on said instrument board and from which starts another conduit **2**^{1}, leading to the engine.

Advantageously, this needle valve is combined with a device capable of enabling the driver visually to check the composition of the emulsion and the rate at which it is being fed. This device consists for instance essentially of a glass tube **8**, advantageously mounted in a removable manner, being for instance held in position by a spring **9** inserted between the lower end of the tube and a screw plug **10** fitting in a frame **11**. This frame can easily be secured to the instrument board **5**, for instance by means of screws extending through holes such as **12** (Fig. 2).

Whatever be the particular embodiment of the invention that is chosen, its operation results sufficiently clearly from the above description for making it unnecessary to enter into further explanations.

Apparatus according to the invention have, over similar apparatus known prior to this invention, several advantages among which the following can be cited;

First, it is possible to improve the working of the engine, despite the dry nature of the fuel that is employed;

Then, it is possible to to adjust the emulsion in an accurate manner;

Finally, the system is very simple and therefore inexpensive.

In a general manner, while we have, in the above description, disclosed what we deem to be practical and efficient embodiments of the present invention, it should be well understood that we do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention.

EMILE LOISON.
CÉSAR MARCHAND.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. LOISON ET AL
LUBRICATION DEVICES
Filed Feb. 12, 1941

Serial No.
378,640

Fig. 1

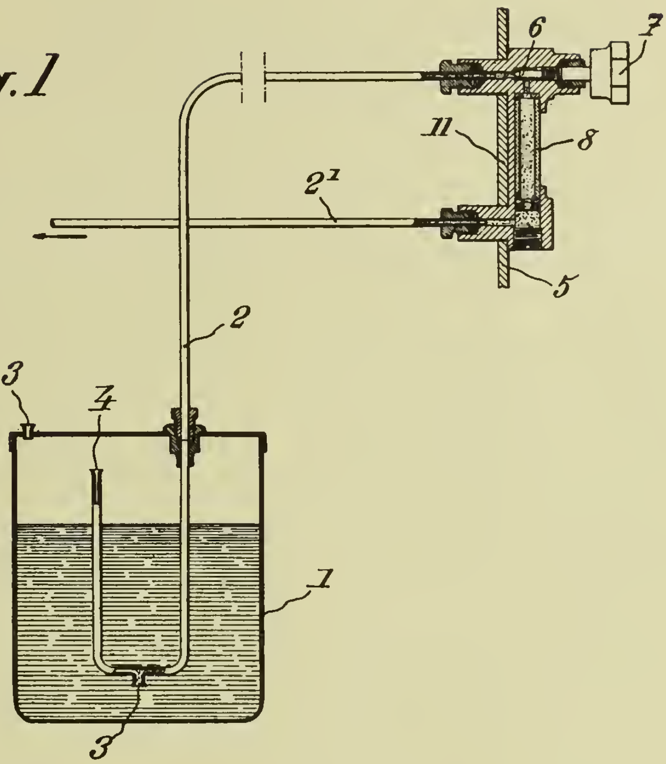


Fig. 2.

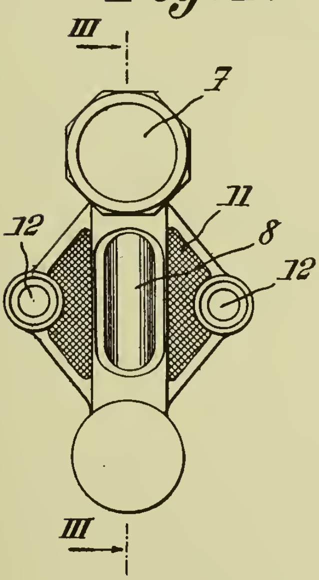
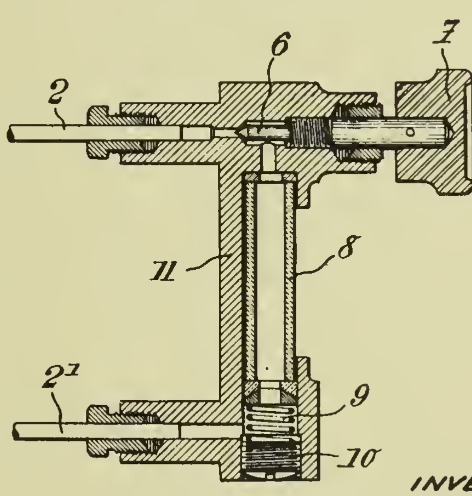


Fig. 3.



INVENTORS
EMILE LOISON,
CÉSAR MARCHAND,

BY Bailey & Larson
ATTORNEYS

Published May 11, 1943

Serial No. 379,550

ALIEN PROPERTY CUSTODIAN

PROCESS FOR EXTRACTING DURABLE CONCENTRATES OF FAT-SOLUBLE VITAMINES FREE FROM FATTY ACID

Felix Grandel, Emmerich/Rhein, Germany; vested in the Alien Property Custodian

No Drawing. Application filed February 18, 1941

The subject matter of this invention is a process for extracting durable concentrates of fat-soluble vitamines free from fatty acid, e. g. from substances of vitamine content which owing to their high percentage of free fatty-acid, chromatogenous matter, unpleasant odour and flavour, also other impurities are unserviceable for the vitamisation of foodstuffs, pharmaceutical preparations and for direct internal therapeutic injection.

In the extraction of fat-soluble concentrated vitamines from natural fats containing vitamines or from adipose substances by means of the usual concentration methods of distillation (molecular distillation amongst others), perforation with solvents and chromatography of the neutral fat portion, not only an over concentration of the active material (vitamines) takes place, but furthermore a reduction in the content of undesirable chromatogenous, odiferous and flavouring matter, and above all the free fatty-acids concomitant with natural fats results.

It is also known to refine fats with ethyl or methylic alcohol respectively, or to refine them by dissolving same in solvents, e. g. benzene, and then neutralising them with ammoniacal alcohol. All these processes aim however, only the total refining of raw fat with the object extracting a practically neutral edible fat as regards appearance, flavour and odour, whilst the vitamine content of the final product is disregarded.

The process under discussion on the other hand concerns itself with the refinement of fat-soluble vitamine concentrates.

Conforming with the invention durable, acid-free fat-soluble vitamine concentrates, incontestable chromatically, adiferously and in flavour can be acquired, when vitamine concentrates, as for example obtained through the process of extraction from vitamised and stearinated fats, or other similar substances obtained by means of monovalent alcohol, are dissolved in an organic solvent, subsequently extracted with diluted monovalent alcohol, e. g. through shaking or perforation.

The hypothesis is that both solvents do not, or to a minimum degree mix in the presence of vitamine concentrates to be refined. As organic solvents all fat-dissolvents come into consideration having little or no solutiveness for diluted monovalent alcohol, e. g. benzene or carbon tetrachloride, and monovalent alcohols which have been approved in practice are methylic alcohol and isopropyl alcohol. It is immaterial according to which method the two solvents are allowed to influence or permeate, since all methods of fluid extraction such as shaking, perforation in suitable apparatus amongst others, have the same aim.

After exhaustive extraction of the acid vitamine concentrates with diluted monovalent alcohol, after severance of both phases and after separate processing by means of distillation one retains a fatty-acid-free concentrate of fat-soluble vitamines having good odour and flavour, and an alcohol extraction residue of the collective free fatty-acids, a large proportion of the chromatogenous, flavour and odoriferous substances besides small quantities of fat-soluble vitamines, which can be greater or lesser according to the concentration of the monovalent alcohols.

Examples

(1) 100 kgs cod liver oil with an acid value 2, a vitamine-A-content of 2000 I. E. per gramme and a vitamine-D-content of 300 I. E. per gramme are exhaustively extracted with 20 kgs of concentrated anhydrous methylic alcohol. The resultant extract (10 kgs) after liberation of methanol shows an acid value 21, a vitamine-A-content 18000 I. E. per gramme and a vitamine-D-content of 2000 I. E. per gramme. This acid vitamine concentrate is dissolved in 10 litres carbon tetrachloride and perforated with 5 litres 90% methanol in the usual manner, six hours being necessary for completion of the process. The alcohol extract and the carbon tetrachloride quintessence are vapourised separately. The alcohol extract (approx. 1 kg) shows an acid value 185 and contains small quantities of vitamines-A and D, flavour and dodriferous substances and stearine, whilst the vitamine concentrate liberated of carbon tetrachloride has an acid value 2, 5, showing a vitamine-A-content of 19000 I. E. per gramme and a vitamine-E-content of 2200 I. E. per gramme.

(2) 1 kg vitamine-E-concentrate with an acid value 50 and a vitamine-E-content 2,5% $\alpha+\beta$ tocopherol is dissolved in 1 litre benzene and thrice shaken with each 300 ccm 88% ethylic alcohol; these ethylic alcohol quintessences are then combined and vapourised. The residue, approximately 300 grammes is very acidy and contains 0.5% $\alpha+\beta$ tocopherol; and the vitamine-D-concentrate, liberated of benzene has an acid value 5.6 and contains 2.3% $\alpha+\beta$ tocopherol.

FELIX GRANDEL.

Published May 11, 1943 Serial No. 379,694

ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR FABRICATING OBJECTS FROM PLY-WOOD AND PRODUCTS THEREOF

Marcelle Jeanne Lyon, Paris, Maurice Louchard, Pantin, and Gaston Guillotel, Paris, France; vested in the Alien Property Custodian

Application filed February 19, 1941

This invention relates to the fabrication of objects of all kinds from ply-wood, and more particularly to objects moulded under pressure from sheets of ply-wood associated with an appropriate binder. It relates more particularly, although not exclusively, to those objects which are adapted to be built up of a relatively large number of layers of very thin wood sheets, ranging in thickness, for example, from 0.05 down to 0.02 inch. While considerably thicker material may be used in our process without overstepping the limits of our invention, we prefer to use thin sheets when possible and have generally obtained better results therewith, both in mechanical strength and in ease and perfection of moulding. A very large variety of objects may be fabricated by our method, such, as by way of example, boats of moderate size, parts of automotive vehicle bodies, airplane bodies, etc.

One object of our invention is to provide an inexpensive method of fabricating objects which, on the basis of equal mechanical strength, will be no heavier, cheaper, of simpler construction and generally more lasting, than similar objects fabricated from metals such as steel or aluminum alloys.

Another object is to provide a method of fabricating moulded objects from ply-wood which lends itself to the most efficient use of the material, allowing the latter to be distributed at will so as to give maximum strength at those points of said moulded objects which will be subjected to the maximum stresses, and in such manner that the lines of maximum strength, that is, the grain of the wood, may be made to coincide substantially with those of said maximum stresses.

Another object is to provide a method of fabricating moulded objects from ply-wood which requires a minimum of capital investment and is therefore readily adaptable to a considerable variation in the volume of production.

A further object of our invention is to provide inexpensive and simple means for fabricating moulded articles from ply-wood, which may be operated by relatively unskilled labor and can be adapted to a wide variety of products.

Yet another object of our invention is to provide objects moulded from ply-wood which possess considerable mechanical strength combined with lightness, of extremely simple construction and requiring a minimum of reinforcing, such as internal bracing, ribs, etc. By way of example, small boats produced by our method require no internal ribbing of any kind, and remain moreover completely water-tight throughout the entire length of their useful life. Likewise, while airplane bodies made of aluminum alloys require a very complex and delicate system of internal bracing which may be rendered unsafe by the breaking of a single strut, such bodies made of ply-wood by our method may be designed so as to derive their entire strength from their walls and to require no bracing whatsoever.

A special object of our invention is to provide composite structures, meaning thereby structures comprising at least two associated parts, said associated parts being either all fabricated from ply-wood according to our method, or some being of ply-wood and some of metal, said parts being joined together according to a special method invented by us which comprises the step of embedding metallic members in the edges of ply-wood parts to be assembled to other parts, said metallic members being moulded in said ply-wood and adapted to engage means of fixation such as screws also engaging appropriate portions of adjacent associated parts, either of ply-wood or of metal.

Another special object of our invention is to provide an airplane propeller blade moulded from ply-wood, which is as strong as one made of aluminum alloys, yet lighter and cheaper, and which is moulded to substantially its final shape, requiring practically no subsequent machining to be ready for service.

These and other objects of the invention will be made clear to a man skilled in the art by the following description of certain embodiments thereof with reference to the appended drawings, it being understood that said description and drawings are exemplary only, and are not to be construed as limiting the invention to anything short of the fullest scope of the appended claims.

In the drawings:

Figure 1 is a general diagrammatic view in cross-section of the preferred form of equipment used in applying our method to the fabrication of a small pleasure boat.

Figure 2 is a view in perspective of the equipment used for effecting one step of our method.

Figure 3 is a diagrammatic view in cross-section of a variant of the equipment shown in Figure 1.

Figure 4 is a view in elevation of our method of making a butt-end joint between a moulded object and a metallic member, in order to build up a composite structure comprising associated ply-wood and metallic parts.

Figure 5 is a cross-sectional view of said butt-end joint.

Figure 6 is an end view of a portion of the edge

of a ply-wood object to be joined with a metallic structure.

Figure 7 is a front elevation of a device for accomplishing one of the steps of our method, that is, grinding a bevel on the edges of sheet-wood sections to be associated in building-up said ply-wood objects.

Figure 8 is a plan view of the same.

Figure 9 is a cross-sectional view thereof.

Figures 10 to 18 inclusive are views of various constructions of airplane propeller blades fabricated by our method.

According to our preferred method of fabricating moulded objects of ply-wood, the wood duly seasoned, is cut according to methods known in the art, into very thin sheets which may, for example, have a thickness ranging from 0.05 down to 0.02 inch. Greater thicknesses may be used without overstepping the bounds of our invention; but we prefer to use thin sheets.

Said sheets are then cut into sections, the outlines of which vary according to the final shape of the object to be fabricated, and are chosen so that, when said sheet-wood sections are assembled, as described below, they cooperate to form said final shape of the moulded object.

In determining the correct outlines of the different sheet-wood sections, their position and the number of layers in the different parts of said moulded objects, we are guided primarily, on one hand, by the shape of the moulded object, and, on the other hand, by the magnitude and direction of the stresses to be imposed in service on the material in said parts of said moulded object.

If the object is simple, of rectilinear and substantially constant cross-section, such as a straight or curved angle or channel, said sheet-wood sections may be cut to rectangular or parallelogrammic outlines. If the moulded object has surfaces presenting a compound curvature, the sheet-wood sections may have suitably curved outlines.

In cutting said sections to the required outlines, we prefer to form a pack of a suitable number of sheets, such as 50 or 100, and cut the different shaped sections by means of a band saw.

The next step is to grind at least one edge of said sections, and preferably two or more of said edges, to a bevel of less than 15°, and preferably of the order of 2° to 5°. This operation may be performed by means of the device illustrated in Figure 7, which will be described later. Said sections are next covered on one or both faces with a binder of suitable physical properties. In general, glues of vegetable origin are sometimes unsuited to this purpose, and we prefer to use binders comprising synthetic resin, which, when set, have the advantage of being substantially insoluble in water. The sections are next assembled, layer by layer, with their bevelled edges substantially overlapping. For this operation we provide a rigid form 1 having a moulding surface presenting the final shape required for one surface of the moulded object. For example, if said object is a canoe, said rigid form may be a wooden pattern, the outer surface of which reproduces exactly the final shape of the inside of said canoe. Said outer surface, which is the moulding surface, we usually form with a thin sheath 13 of lead sheet or other plastic metal closely fitting said pattern, which metal sheath will subsequently be heated, as by means of an electric current, for the purpose of accelerating the setting of the binder. Said rigid form we place on a wooden platform or table 2, which is rendered air-tight by any suitable means, for example by applying to the lower surface thereof a sheet of lead 3, which we fold around the edges of said platform, as shown in Figure 1. Said platform has one or more orifices 7 suitably formed therein, in which orifices are inserted nipples 7 for connection to a vacuum pump. Suitable spacing blocks should be inserted between the rigid form 1 and the platform 2, in order to provide free passage for the air around said form.

In assembling the sheet-wood sections, we use either of two methods of procedure, the first indicated in Figure 1 and the second in Figure 3. According to the first, we lay the sections directly on the moulding surface of the rigid form, with their bevelled edges substantially overlapping, forming the required number of layers to make a multi-ply wall 4, until the whole moulding surface of the rigid form 1 is covered.

According to the second method, illustrated in Figure 3, we lay the sheet-wood sections on a flat surface, with their bevelled edges substantially overlapping, until the multi-ply wall has the required thickness and area. We then clamp the edges of said multi-ply wall by means of longitudinal clamps 12. We next lift the wall and clamps bodily onto the rigid form 1, and gradually draw said wall down to conform with the moulding surface of said rigid form, the sheet-wood sections sliding over each other during this operation, to adjust themselves to said moulding surface.

In the course of the operation of building-up the ply-wood wall, we generally prefer to form alternate layers of ply-wood with the grains of the wood crossed at least at a small angle, the general direction of the grains of said alternate layers, at different points of said moulded object, substantially coinciding with the general direction of the stresses to be subsequently imposed in service upon the material at said points, and the number of layers being proportioned to the magnitude of said stresses. At such points exposed to sudden variable and concentrated loads, such as the floor of a boat, we prefer to provide stiffening members such as longitudinal ribs, which may be of wooden lath or built up from ply-wood, said longitudinal ribs being placed on said rigid form 1 in suitable recesses formed therein, so that, when the multi-ply wall is subsequently moulded thereon, said stiffening ribs will be cemented to and become an integral part of the multi-ply wall at said points.

In the next step, we use a mat 5 of rubber or other plastic and air-tight material. Said mat may be laid directly onto the outer surface of the multi-ply wall 4, or if a smooth outer surface is desired, a flexible form 14 may preferably be interposed between said mat 5 and said multi-ply wall 4. Said flexible form 14 should be built so as to be locally rigid, in order to eliminate local surface irregularities, but should be generally flexible, so as to conform perfectly with the surface to be moulded. We generally build said flexible form 14 out of thin ply-wood, and sometimes cut slits in suitable parts of its surface, in order to increase its flexibility, said slits being covered internally with strips of canvas or thin sheet metal, in order to prevent their leaving traces on the outer surface of the moulded object. The inner surface of said flexible form 14 is the moulding surface for the outer surface of the moulded object, and should have approximately the final shape of said moulded object.

When the flexible form 14 has been fitted over the multi-ply wall and the rigid form 1, the metal sheath 13 of the moulding surface of the rigid form is connected to the terminals of the secondary of a step-down transformer, designed to deliver very low voltage and very high current. Said connection is usually made through the platform 2, by air-tight means. The plastic mat 5 is then laid over the flexible form, so as to completely cover the latter, and its edges are clamped, by means of clamps 6, to the edges of the platform 2, so as to form an air-tight seal therewith. Nipples 7 are next connected to a vacuum pump (not shown) and the air is exhausted from the inside of the inclosure formed between the plastic mat 5 and the platform 2. When the pressure has been lowered to such an extent that the mat exerts a powerful pressure on said flexible form, thus compressing the multi-ply wall 4 between the rigid and flexible forms, the primary circuit of the transformer is closed and a heavy current flows through the metal sheath 13 of the moulding surface of the rigid form 1 and heats said sheath to a predetermined temperature, which should be sufficient to polymerize the binder and cause it to set rapidly. This usually takes 15 to 20 minutes. The current is then broken, the vacuum is relieved, the mat is removed and the moulded object may be unmoulded.

In fabricating large objects, we have found the weight of the plastic mat to be too great to be readily handled manually. We have therefore found it convenient to use a device illustrated in Figure 2. The mat is rolled on a small diameter drum 8, supported by end gears 9 engaging racks 10 supported above the platform 2, on a suitable supporting framework 11, which may either be supported from the floor or the platform or suspended from above by any convenient means. As the mat is rolled on or unrolled from said drum 8, it travels lengthwise over the surface of the platform 2, and may easily be laid over the moulded object.

According to the procedure illustrated in Figure 3, the clamping means 12 remain imprisoned under the mat until the vacuum is relieved, and are removed afterwards.

It frequently happens that, in the fabrication of objects of complex design, such as airplane bodies, it is necessary to build the object in separate associated parts, and to assemble said parts in such manner that they may be disassembled, if necessary. Said different parts may be all made of ply-wood, according to our method or any other appropriate method, or some may be of ply-wood and others of metal. The junction of two ply-wood parts, or of one ply-wood and one metallic parts, presents no difficulty when they may be assembled laterally as in a lap-joint. But in all cases requiring a butt-end joint, the problem presents considerably more difficulty, because the use of means of fixation such as screws directly in the thickness of a ply-wood wall does not give sufficient strength to insure a secure joint.

In these cases, we have devised a method of making a butt-end joint presenting the same guarantees as to strength as a metal-to-metal joint. Such a butt-end joint is illustrated in Figures 4, 5 and 6, the first in side elevation, the second in cross-section and the third in end elevation. According to a preferred form of this method, we proceed to embed in the thickness of the ply-wood part and at the edge thereof, a metallic member *c* adapted to be drilled and tapped to engage means of fixation such as screws which will serve to join said ply-wood part with the associated part. In order to embed said metallic member *c* in said ply-wood wall *d*, we generally taper the wall as shown in Figure 5. We then build up from sections of sheet-wood 3 two bands of ply-wood *a* and *b*, with which will be formed two angles with unequal legs. The longer leg of angle *a* is cemented to one face a_1 of the ply-wood wall *d*. The metallic member *c* is then placed in position, and the shorter leg of angle *a* is then folded at right angles so as to cover said metallic member *c*, pressed down onto said metallic member, held until the binder has set and then cut off flush with the far edge of member *c*. The longer leg of angle *b* is next cemented to the face b_1 of ply-wood wall *d*, the shorter leg of angle *b* is folded over and pressed down onto the shorter leg of angle *a*, maintained thus until the binder has set, then cut off flush with the outer face of the longer leg of angle *a*. Finally the lateral legs of the two angles are planed down flush with the faces of the ply-wood wall *d*. Holes are then drilled through the shorter legs of the angles into said metallic member *c* and tapped.

If the ply-wood part is to be joined with an associated metallic part, such as an angle *f* fixed to a plate *e*, screws such as *i* may be used. If said ply-wood part is to be butt-ended with a similar ply-wood part, studs may be used as joining means, with right and left threads on the opposite ends, while recesses are formed in the ply-wood wall through which means may be inserted to tighten up the studs.

By the above method, robust and thoroughly secure butt-end joints may be made between ply-wood parts or between ply-wood and metallic parts.

The method described above must be modified to a greater or less extent in certain cases, depending on special features of the object to be fabricated. For example, it frequently happens that said object comprises an inner rigid framework covered over on all faces with multi-ply wooden walls. Specific examples of such objects are the different forms of airplane propeller blades illustrated in Figures 10 to 18. All of said forms of propeller blades consist of a rigid framework and of ply-wood outer walls formed on and cemented to said framework, the latter fulfilling in the manufacturing process a function closely similar to that of the rigid form 1 in the general method, with the exception that the framework remains an integral part of the final moulded product and inclosed therein. Optionally, the propeller blade may be provided with metallic reinforcing around the tip and/or leading and trailing edges, as indicated in Figures 17 and 18.

The rigid framework may be built up in a variety of ways. For example, Figure 10 shows one solution comprising a series of enveloping looped members 2 with their ends extending into the hub-engaging root of the blade and moulded together into a rigid block therein. Multi-ply wooden walls 1 are then formed on and moulded with both faces of said framework and the blade is given its final shape and pitch during the moulding operation, so as to require practically no subsequent machining or finishing.

Figure 11 shows a type of blade differing from that of Figure 10 in that some of the longitudinal members 2 instead of being looped, are bent to approximately triangular shapes, so as to pro-

duce cross-bracing effects which add considerably to the rigidity of the blade in the plane of rotation.

Figure 12 shows a different type in which the framework is built up of a plurality of longitudinal rib-members **2**, moulded together in the hub-supported root and at the tip of the blade and flared out between these points and separated by spacing blocks **3**, to form the body of the blade.

The type shown in Figure 13 has a heavy central longitudinal rib member **6** extending from the tip down into the root, said rib member being cross-braced by lateral members **2** bent and moulded alternately to the edge member and to the central member **6**. In the type shown in Figure 14, the longitudinal ribs **2** are bent and moulded together at such points as to form a honeycomb structure. In Figure 15, we have still another type comprising a heavy longitudinal member **6**, as in Figure 13, lighter longitudinal members **7**, and elastic spacing members **3** formed into a flattened ring shape, said spacing members **3** being moulded with the longitudinal members on each side of them. Figure 16 shows still another type in which the longitudinal members are given a sinuous shape and assembled in out-of-phase relation, spacers **3** being inserted between them at suitable points.

Figures 17 and 18 illustrate, the first in cross-section, the second partly in elevation and partly in broken section, a portion of a propeller blade of ply-wood provided with metallic reinforcing around its edges. The multi-ply surface walls **1** are moulded with the frame ribs **2**. The outer frame ribs **9** are made in two parts forming between them a deep slot. The reinforcing metallic member **4** is cast with a rib or fin member **5** which is machined to fit into said slot between said frame ribs **9**. In order to provide safe anchorage between said fin member **5** and the frame ribs **9**, the fin **5** has holes **8** formed in it which are filled with binding glue. When the binder has set, the metallic reinforcing fin **4** is securely held between the frame ribs **9**.

Our invention also covers the apparatus used in the application of our method, which apparatus has been described in the foregoing pages, with the exception of the device used to grind the edges of said sheet-wood sections to an angle of less than 15°, and preferably of the order of 2° to 5°.

Such an operation is delicate and requires special care to avoid tearing the sheet-wood sections. One embodiment of the device used is illustrated in front elevation in Figure 7, in plan in Figure 8 and in cross-section in Figure 9. In its preferred form, this device comprises a frame **1** supporting a table **6** and a bearing **2**, in which is journaled a shaft **3** bearing a grinding wheel **5** and a driving pulley **4**. The upper portion of said grinding wheel **5** projects through an aperture formed in table **6**. A work support **7** is hinged at **8** to the table **6** and may be fixed at any desired small angle with said table **6** by means of bolts **11** slidable in grooves **12**. An abutment guide **13**, with its lower bearing surface substantially parallel to said work support **7**, may be clamped adjustably by means of a screw and nut, **15** and **16**, to a support **14** bolted to said work support **7**. Said work support **7** comprises an aperture through which the grinding wheel **5** projects just enough to have one circumferential edge flush with the upper surface of said work support **7**.

With this device, the operation of bevelling the edges of the sheet-wood sections is very simple. Said sheet-wood section *a* in Figure 9, is held flat on the work support **7** and fed longitudinally, in the plane of the grinding wheel **5**, between the periphery of said grinding wheel and the abutment guide **13**. The operation lasts a few seconds.

The grinding wheel may be a relatively coarse-grained emery wheel, or a wooden wheel upon which is fixed a band of sand paper or similar abrasive.

MARCELLE JEANNE LYON.
MAURICE LOUCHARD.
GASTON GUILLOTEL.

PUBLISHED
MAY 11, 1943
BY A. P. C.

M. J. LYON ET AL

METHOD AND APPARATUS FOR FABRICATING OBJECTS FROM PLY-WOOD AND PRODUCTS THEREOF

Filed Feb. 19, 1941

Serial No.
379,694
6 Sheets–Sheet 1

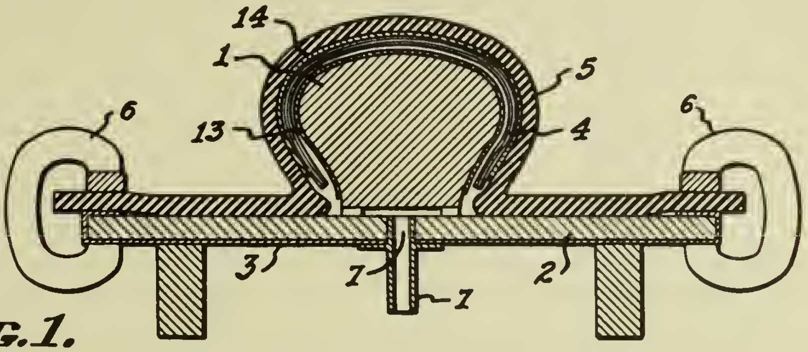


FIG. 1.

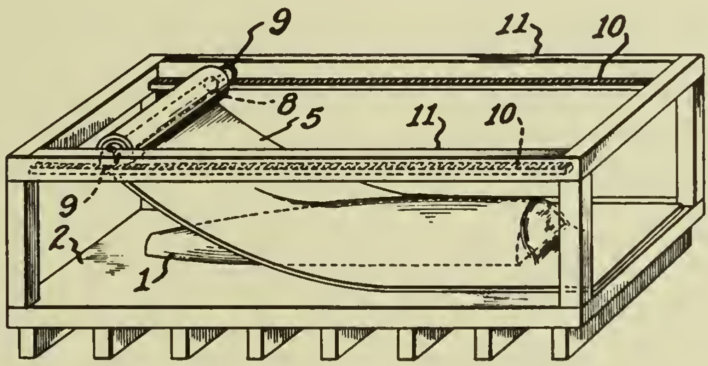


FIG. 2.

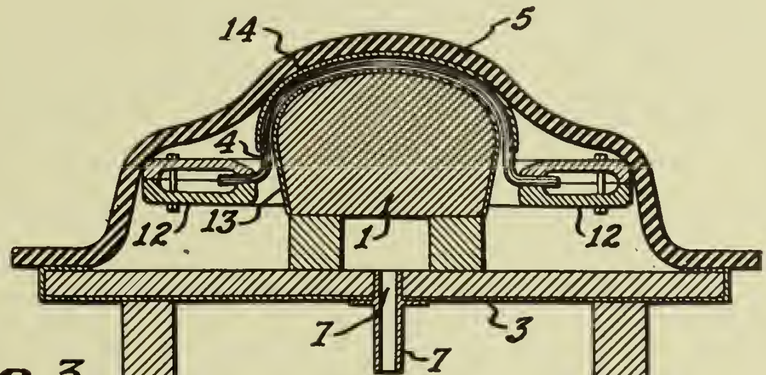


FIG. 3.

INVENTORS.
MARCELLE JEANNE LYON,
MAURICE LOUCHARD
BY AND GASTON GUILLOTEL.
Allen & Allen
ATTORNEYS

PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. J. LYON ET AL
METHOD AND APPARATUS FOR FABRICATING OBJECTS
FROM PLY-WOOD AND PRODUCTS THEREOF
Filed Feb. 19, 1941

Serial No.
379,694
6 Sheets-Sheet 2

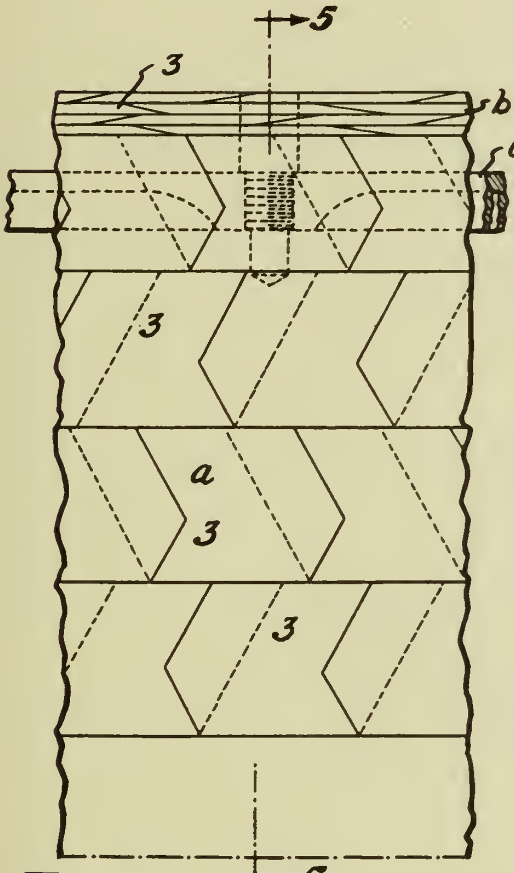


FIG. 4.

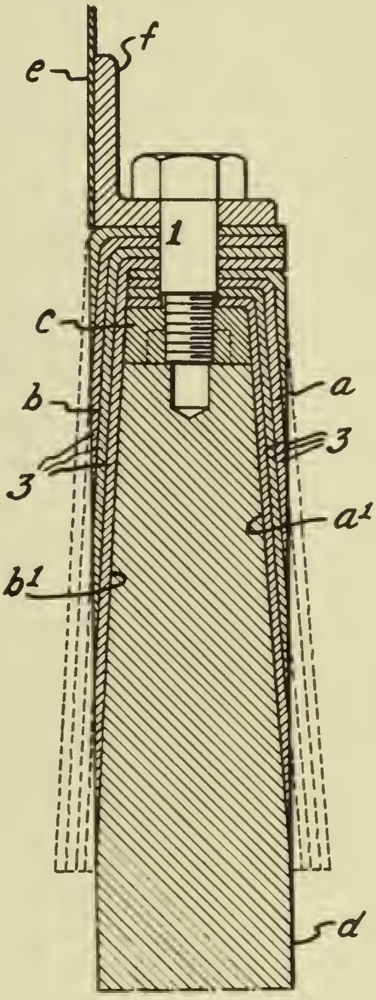


FIG. 5.

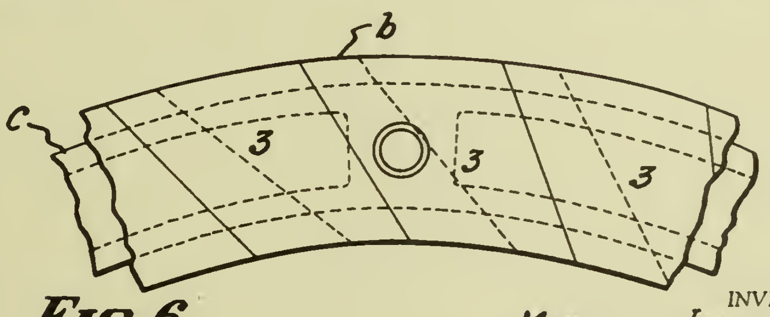


FIG. 6.

INVENTORS.
MARCELLE JEANNE LYON,
MAURICE LOUCHARD
AND GASTON GUILLOTEL.
BY Allen & Allen
ATTORNEYS

PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. J. LYON ET AL
METHOD AND APPARATUS FOR FABRICATING OBJECTS
FROM PLY-WOOD AND PRODUCTS THEREOF
Filed Feb. 19, 1941

Serial No.
379,694

6 Sheets–Sheet 3

FIG. 7.

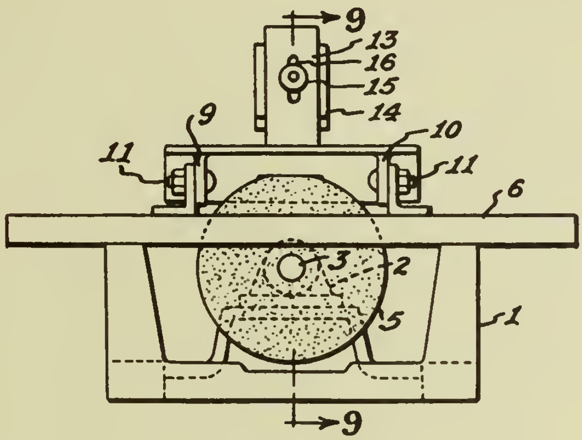


FIG. 9.

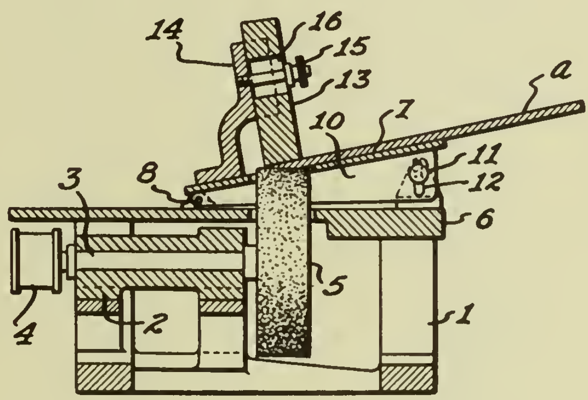
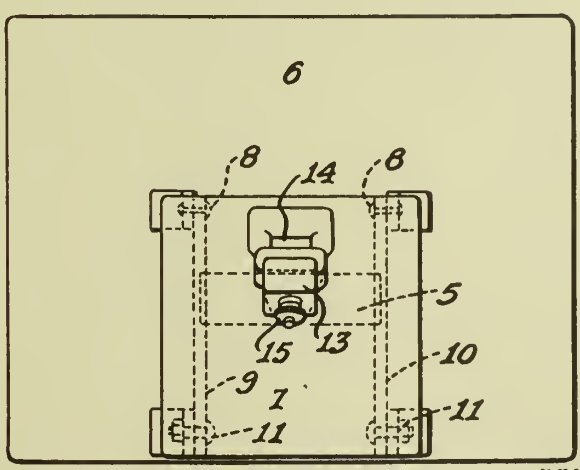


FIG. 8.



INVENTORS.
MARCELLE JEANNE LYON,
MAURICE LOUCHARD
BY AND GASTON GUILLOTEL.
Allen & Allen
ATTORNEYS.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. J. LYON ET AL
METHOD AND APPARATUS FOR FABRICATING OBJECTS
FROM PLY-WOOD AND PRODUCTS THEREOF
Filed Feb. 19, 1941

Serial No.
379,694
6 Sheets–Sheet 4

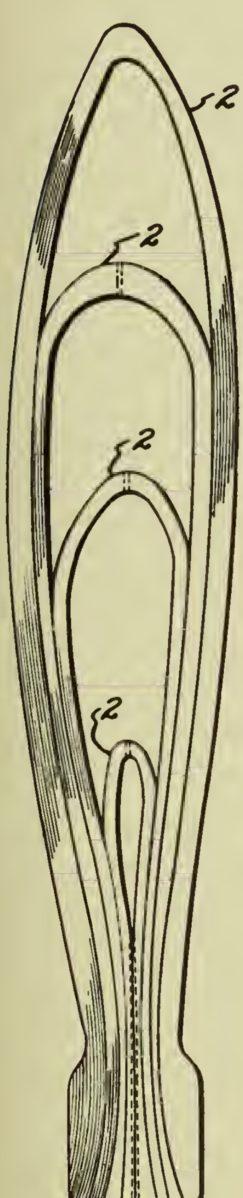


FIG. 10.

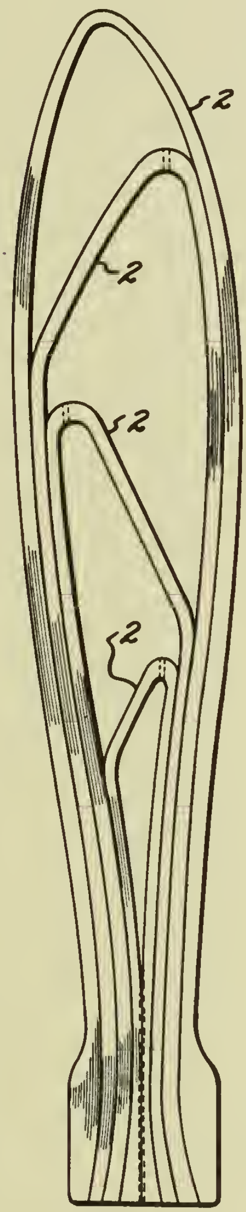


FIG. 11.

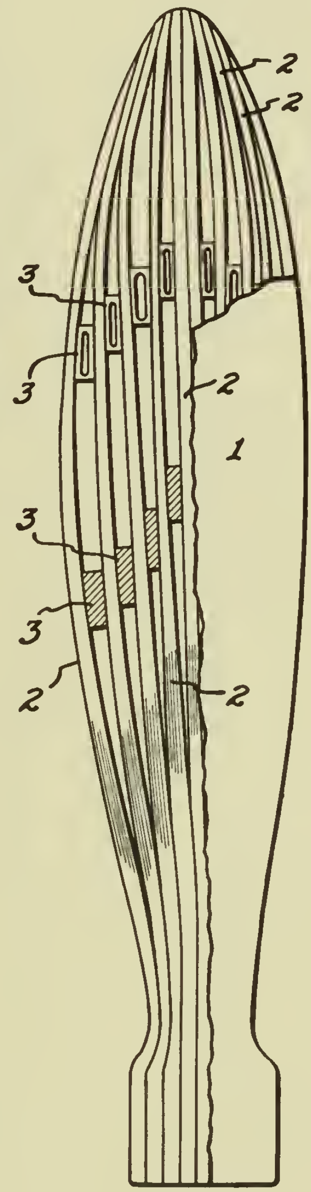


FIG. 12.

INVENTORS.
MARCELLE JEANNE LYON,
MAURICE LOUCHARD
BY AND GASTON GUILLOTEL.
Allen & Allen
ATTORNEYS

PUBLISHED

MAY 11, 1943

BY A. P. C.

M. J. LYON ET AL

METHOD AND APPARATUS FOR FABRICATING OBJECTS FROM PLY-WOOD AND PRODUCTS THEREOF

Filed Feb. 19, 1941

Serial No. 379,694

6 Sheets-Sheet 5

FIG. 13.

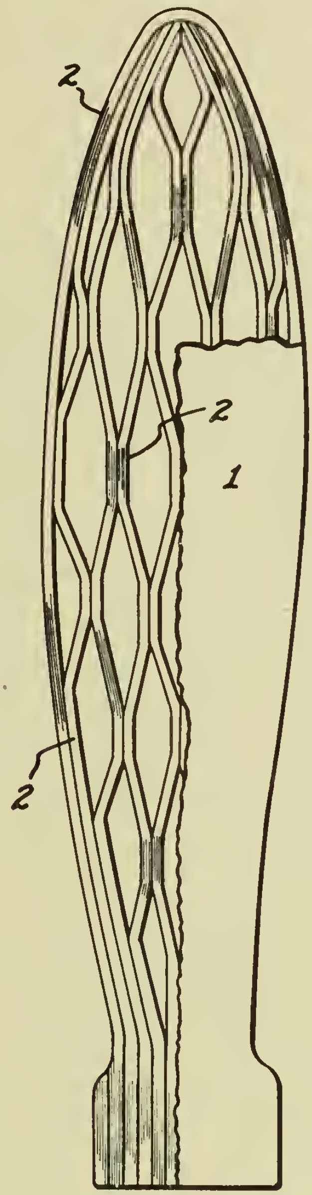


FIG. 14.

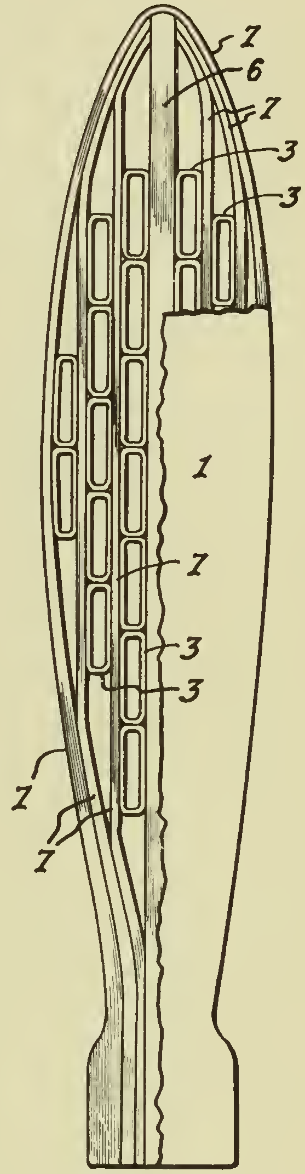


FIG. 15.

INVENTORS.
MARCELLE JEANIIE LYON,
MAURICE LOUCHARD
AND GASTON GUILLOTEL.

BY Allen & Allen

ATTORNEYS.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. J. LYON ET AL
METHOD AND APPARATUS FOR FABRICATING OBJECTS
FROM PLY-WOOD AND PRODUCTS THEREOF
Filed Feb. 19, 1941

Serial No.
379,694
6 Sheets–Sheet 6

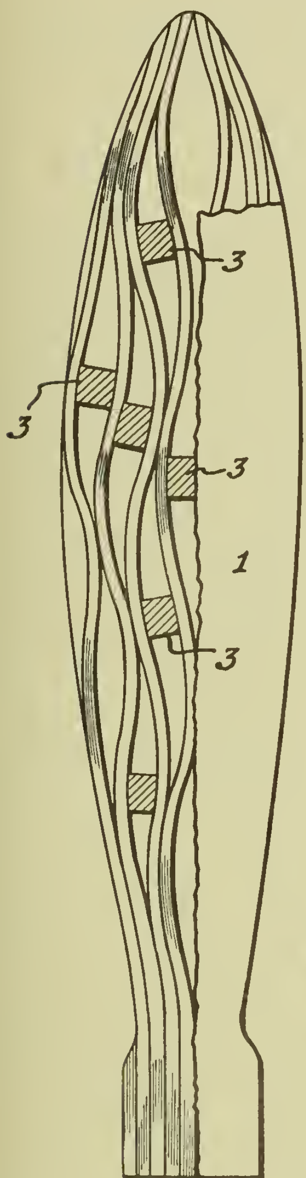


FIG. 16.

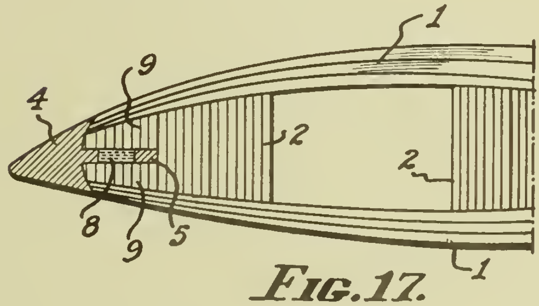


FIG. 17.

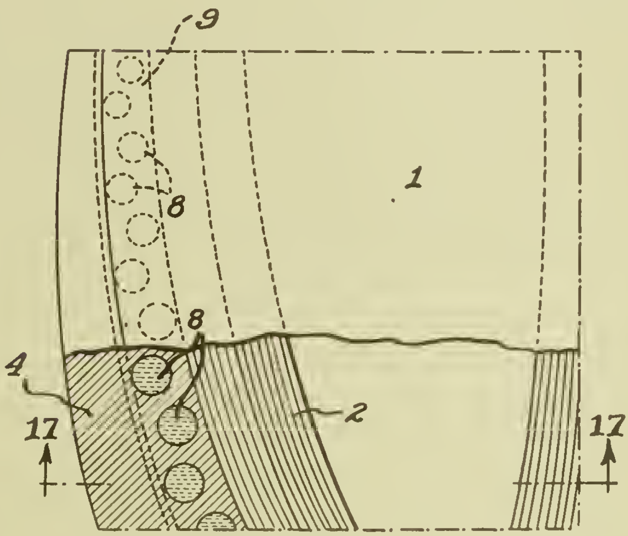


FIG. 18.

INVENTORS.
MARCELLE JEANNE LYON,
MAURICE LOUCHARD
AND GASTON GUILLOTEL.
BY Allen & Allen
ATTORNEYS.

Published May 11, 1943 Serial No. 380,014

ALIEN PROPERTY CUSTODIAN

LADY'S HANDBAG

Daniele Morichetto, Gablonz A. N., Germany; vested in the Alien Property Custodian

Application filed February 21, 1941

Ladies' handbags serve, amongst for other purposes, for holding toilet articles such as powder boxes, mirror, lipstick and the like. These articles are loosely lying in the handbag together with the other things and consequently, when they are wanted, they are not ready to be gripped at once. As such articles are generally used from time to time, each time it will be necessary to fumble amongst the contents of the handbag which is very disagreeable and may lead further to damaging the articles or the other contents of the handbag.

It has already been proposed, to connect the toilet articles with the handbag so that they cannot be detached. The arrangement is such that the toilet articles on the one hand occupy almost the whole width of the handbag and on the other hand are hinged on one of the bows of the frame or on a separate third bow. The handling of the toilet articles is rendered very difficult in this manner, as the person who uses the handbag must hold not only the handbag but also the toilet articles, in order for instance to bring the mirror into the correct position. The hinged mounting is especially inconvenient when the powder box is to be used as then a certain resistance must exist in order that the powder, which is used in solid form, can be detached by means of the powder puff.

A further inconvenience is that the handbag is not accessible as long as the toilet articles are used, for the reason that the handbag opening is occupied by the toilet articles.

In opposition hereto a handbag is provided according to the invention, in which also the toilet articles are directly connected with the handbag itself, but in such a manner that on the one hand the access to the handbag is not disturbed in the least, and on the other hand only the handbag itself but not the toilet articles need to be held by hand. This is attained thereby that the plate carrying the toilet articles is rigidly connected with one of the bows of the handbag frame and the toilet articles themselves, for instance powder box on the one hand and mirror with lipstick on the other hand, are mounted on the upper and lower edge of the plate and constructed so that they fold the one over the other when the handbag is closed and one of the articles covers the other one. A part herefrom the access to the handbag is even then not impeded, owing to the special arrangement of the toilet articles, when these articles are used as they occupy only a comparatively small part of the handbag.

By the invention the special advantage is obtained, besides the already mentioned advantage of better handling, that the plate carrying the toilet articles can be subsequently mounted on any handbag for instance by riveting or the like. The base plate for the toilet articles can be evidently also rigidly connected with the handbag frame from the beginning and especially in the case the manufacturer of the handbag frames produces at the same time also the holder for the toilet articles.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which

Fig. 1 shows the interior of a handbag the toilet articles, hingedly fixed on a plate, being in the position ready for use,

Fig. 2 shows an open handbag with the toilet articles in the state ready for closing.

On the frame **1** of the handbag a lock **2** is arranged and further a supporting plate **3** is fixed preferably by hollow rivets **4**. On the plate **3** toilet articles such as powder box **5**, mirror **6** and lipstick **7** are mounted. The mirror **6** is mounted on plate **3** by means of a hinge **8** and the powder box by means of a hinge **9**. The lipstick **7** is laterally mounted on the inner edge of mirror **6**. The powder box **5** is held by a stop in the unfolded position and further equipped with a lock **10**, by which the powder box, when folded up, is securely held on plate **3**. The mirror **6** also has a lock **11** by which it is held in the folded down state. The lipstick **7** is inserted in a sleeve fixed on the mirror frame and securely held in this sleeve by a lock **12**.

When the toilet articles are to be used, it is no longer necessary to fumble in the contents of the handbag as the individual articles are immediately ready to be gripped and can be rapidly unfolded so that they can be used without preventing in any manner the use of other articles carried in the handbag.

DANIELE MORICHETTO.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

D. MORICHETTO
LADY'S HANDBAG
Filed Feb. 21, 1941

Serial No.
380,014

Fig.1

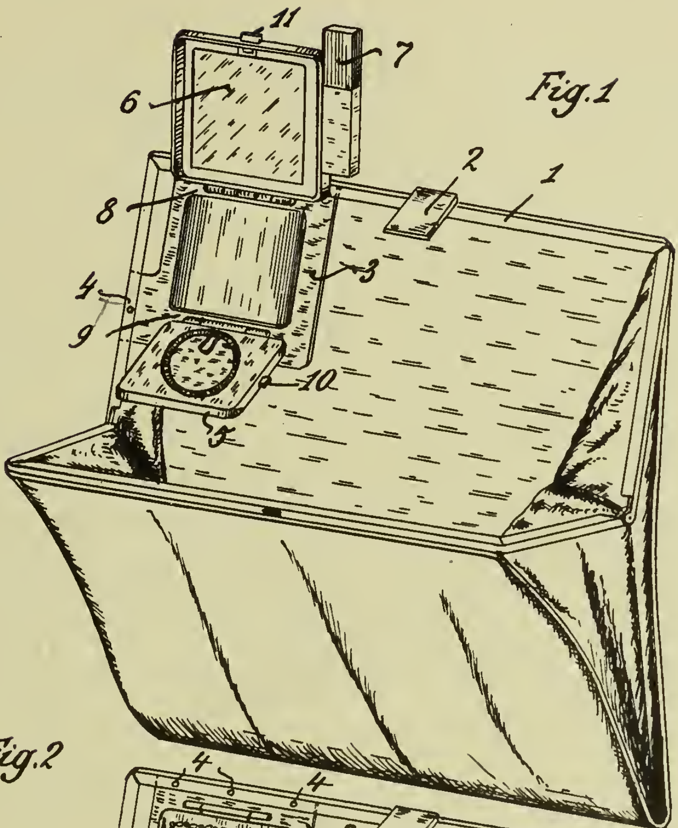
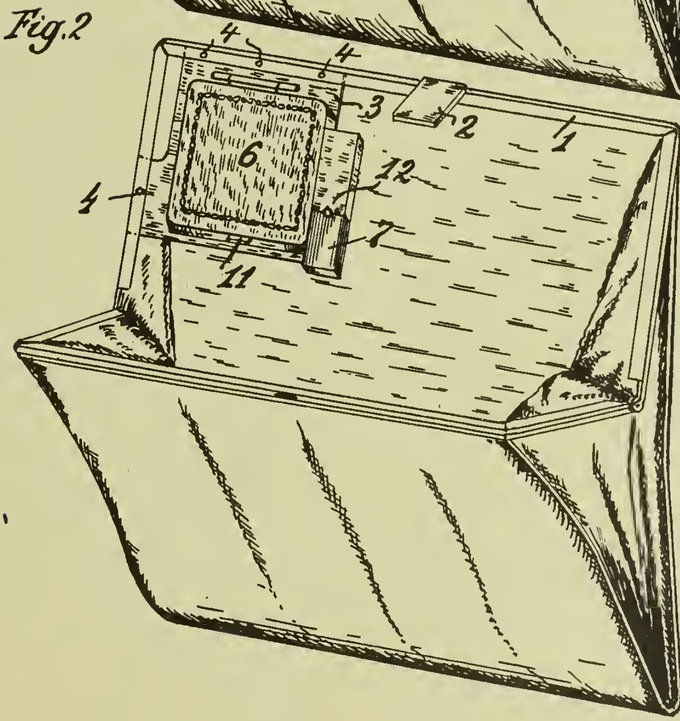


Fig.2



Daniele Morichetto
Inventor
by Knight
Atty.

Published May 11, 1943 Serial No. 381,094

ALIEN PROPERTY CUSTODIAN

METHOD OF OPERATING FREE-PISTON INTERNAL COMBUSTION ENGINES

Franz Neugebauer, Munich-Allach, Germany; vested in the Alien Property Custodian

Application filed February 28, 1941

This invention relates to a method of operating free-piston internal combustion engines in which

1. the working space is scavenged with fresh air or charged before each compression stroke, the whole of the fresh air, enclosed in the working space after the fresh air inlets and the exhaust gas outlets have been closed, being available for the combustion step and being, immediately after this closure, compressed with continuously increasing pressure, and in which

2. the fuel, especially liquid fuel such as gas oil, is admitted to the working space of the motor apart from the combustion air and is exploded by means of compression ignition.

The principal object of the invention is to improve the combustion step taking place in the working space of the motor, in order to obtain a better utilization of the introduced fuel and, on the other hand to decrease to a considerable extent the formation of residues of combustion (oil coal or the like) in the working space, for instance, at the borders of the outlet openings. This is attained according to my invention by introducing into the working space either the whole of the fuel to be supplied per one cycle, or a considerable part of it during the compression stroke before the temperature of self-ignition is reached so as to form a fuel-air mixture and to further compress this mixture until it finally reaches the ignition-temperature and is burnt. The fuel may be supplied already during the closure of the outlets. When operating according to the invention a relatively long period is available for mixing the combustion air with the fuel so that the conditions for obtaining a complete mixture and therewith a combustion as complete as possible are more favorable than, for instance, with the normal Diesel system in which the whole of the fuel is supplied to the combustion chamber only after the temperature of self-ignition is reached and therefore the intimate mixture of fuel and air required for the combustion can be obtained only with greater difficulty.

The operating method according to the invention will now be more fully explained at the hand of the annexed diagram.

In this diagram on the horizontal axis the displacement s of the motor piston is cut off. The line A—B corresponds to the stroke of the motor piston, A representing the outer, B the inner dead point. Point C denotes the beginning of the compression (closure of the outlet openings of the working space of the motor). Line B—D corresponds to the noxious space. Above the horizontal axis four curves **1** to **4** are drawn. The curves **1** and **2** show the displacement h of the piston of the injection pump, to wit curve **1** relates to the Diesel system as hitherto used in free-piston internal combustion engines, whereas curve **2** is for an example of the operating method according to the invention. Curve **3** shows the course of the compression temperature of the air enclosed in the working space of the motor. Curve **4** represents the course of the ignition-temperature for a certain fuel, for instance, gas oil (one of the fractions obtained by distilling petroleum, having a specific gravity of about 0.865), this ignition-temperature being known to decrease with increasing compression of the air surrounding a particle of fuel. The temperature of self-ignition of the employed fuel is determined by the point of intersection S of the two curves **3**, **4**. In the present example it amounts to 520° abs.

Point E on the horizontal axis corresponds to point S; this point E must have been reached by the working piston of the motor on its compression stroke in order that the self-ignition temperature of the fuel be reached by the compression of the combustion air performed till then. In the normal Diesel system as usually employed hitherto the whole of the fuel required for each working stroke is injected into the working space of the engine only after the self-ignition temperature is reached. The injection begins in this case a short distance behind the point E at a point corresponding to the point F of the curve **1** denoting the displacement of the piston of the injection pump, and lasts up to point G of this curve. It extends therefore only over the short way a (horizontal distance of the points F, G) of the working motor piston and accordingly lasts only for a very short period. The injected amount is represented in this case by the line b (the vertical distance of points F, G).

When operating in accordance with the invention the injection of the fuel begins already at a considerable distance from the point E, to wit in point H of the curve of displacement **2**; it ends in point K of the same which in the example shown lies a short distance behind point E. The injection therefore extends over the distance c between the points H, K which is considerably greater than the distance a and also involves a longer injection period. Nevertheless the amount of the injected fuel is the same as in the former case, to wit the amount indicated by line b.

If in a common internal combustion engine

having its piston forcibly attached to a crank shaft the fuel were supplied in this way, i. e. if the whole of the fuel were supplied during the compression stroke before the self-ignition temperature would be reached, the whole charge of fuel would be suddenly exploded at the self-ignition point E of the travel of the piston, i. e. at a considerable distance from the inner dead point B. A pure equal-space combustion would result which, as we know, in itself is connected with a very steep ascent of pressure. Because, however, the motor piston under the action of the crank shaft is further driven inwardly beyond the inner dead point, the ascent of pressure is hereby still further increased to a considerable extent and the working space and the gearing are subjected to extraordinary stresses; hereby especially unfavorable dynamic stresses in the elastic parts of the gearing are produced. As furthermore in an engine of this kind the working piston would stay for a relatively long time near the inner dead point, the wall of the combustion space would be exposed for a long time to the excessively high temperature of the combustion gases which, owing to the dissipation of heat increasing with the pressure, would involve a considerable loss of energy and an excessive impairment of the constructional materials.

Quite other conditions prevail in connection with internal combustion engines having free pistons in which the inner dead point is not forcibly determined by a gearing. On the contrary, the flying mass may turn back when the energy with which it is projected toward the inner dead point has been consumed by the compression work to be done on this stroke. The flying mass is therefore not retained for a longer time in the proximity of the inner dead point, but undergoes a vehement retardation on the inward stroke owing to the sudden increase of pressure caused by the combustion, whereby it is rapidly stopped, and this retardation is followed by a vehement acceleration whereby a rapid motion in the reverse direction is effected. Thus the drawbacks appearing in connection with crank shaft engines do not exist with free piston engines. This fact was ascertained by experiments.

Besides the advantages of the new operating method already referred to the following advantage is to be noted: The forces of masses acting on the piston of the injection pump which, when excessive, would interfere with the course of the injection are essentially lower than in the normal Diesel system which appears at once from the more flat course of the displacement curve 2 as compared with the much steeper curve 1. In this connection it may be noted that the diagram in which the beginning of the displacement of the pump piston approximately coincides with the beginning (point C) of the compression does not even represent the most favorable case. On the contrary, it is especially advantageous to begin with the supply of fuel already during the closure of the outlet openings. In this case the beginning of the supply (point H) would lie considerably farther to the left (even on the left side of point C), whereas the end of the supply (point K) may retain its position. The curve 2 would then show a much flatter course. By such a course of the injection, moreover, abundant time for mixing air and fuel is available whereby the mixing is considerably promoted.

The part H—K of the curve 2 which is illustrative of the supply of fuel may also be shifted as a whole from the position shown in the diagram to the right so that merely a notable part of the quantity of fuel to be supplied, at least about 30 p. Ct. is supplied to the working space of the motor before the self-ignition temperature has been reached. Hereby also an essential improvement of the combustion step over the normal Diesel system is attained.

It has proved especially advantageous by virtue of experiments to position the point K of the curve 2 (indicating the end of the fuel supply) or the corresponding point L on the horizontal axis in such a manner that the ratio of the line L—D to line C—D (the ratio of the compression volumes) is about 1:5.5.

The described advantages of the invention are also obtained if only a considerable part of the amount of fuel required for each working cycle is introduced into the working space of the motor, before the temperature of self-ignition is reached, and the resulting mixture is further compressed up to self-ignition, the remainder of the fuel being supplied only after the ignition of the first-mentioned fractional amount. This enables the degree of the ascent of pressure produced by the combustion to be influenced and a too abrupt initiation of the combustion to be avoided.

A further advantage of the method according to the invention over the usual Diesel system was ascertained, viz. that the invention requires a considerably smaller amount of scavenging air because owing to the longer period available for mixing air and fuel a smaller total amount of air suffices to bring the fractional amount of air required for the combustion of each single particle of fuel into contact with this particle. The power for supplying the scavenging air is correspondingly reduced.

On the other hand with unreduced supply of scavenging air it is possible to temporarily overload the free piston engine to a considerable extent, because even with increased supply of fuel sufficient air is present to warrant complete combustion of the mixture.

The displacement curve 2 corresponds—in the case of supplying the fuel by means of a pump—to the shape of the cam driving the piston of the pump which cam is rigidly connected with a member participating in the displacement of the motor piston.

FRANZ NEUGEBAUER.

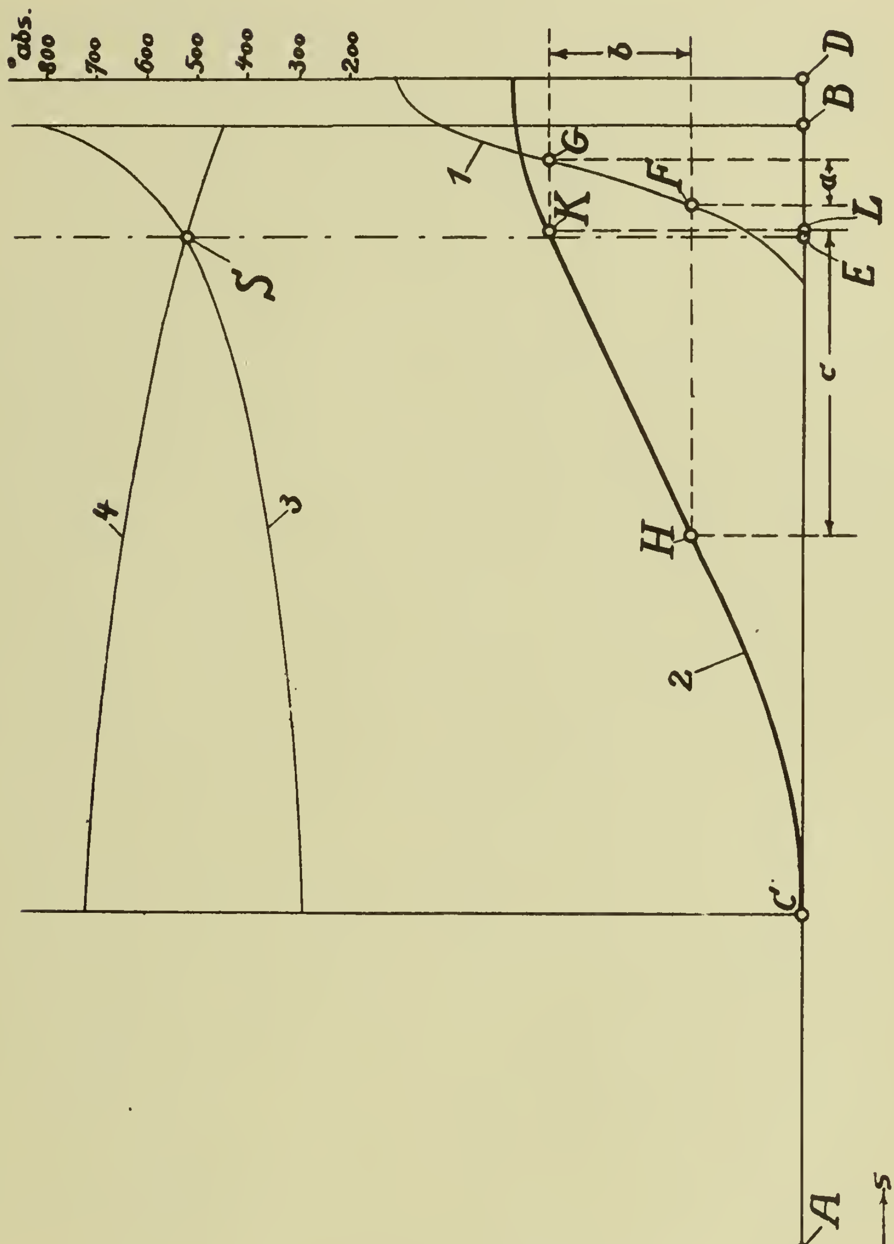
PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. NEUGEBAUER
METHOD OF OPERATING FREE-PISTON
INTERNAL COMBUSTION ENGINES
Filed Feb. 28, 1941

Serial No.
381,094



Inventor:
Franz Neugebauer
by
Attorney

Published May 11, 1943

Serial No. 380,605

ALIEN PROPERTY CUSTODIAN

PROCESS OF PREPARING CEMENT POWDERS AND ACID-PROOF MORTARS

Karl Dietz, Kronberg im Taunus, Germany; vested in the Alien Property Custodian

No Drawing. Application filed February 26, 1941

The present invention relates to cement powders, acid-proof mortars and a process of preparing them, as well as to containers lined with acid-proof bricks and acid-proof mortars.

In recent times there have been used in the art for acid-proof linings of receptacles nearly exclusively acid- and water-proof, liquid-tight water-glass cements which are self-hardening even with exclusion of air. These cements are obtained by mixing cement powders with alkali silicate; the latter is either added as aqueous solution or, in case it is admixed to the cement powder in pulverulent form, becomes active when the whole is made up with water. The self-harening of the cements is principally due to the presence of such substances as react with the alkali of the water-glass and thereby precipitate the silicic acid of the water-glass. Alkali-reactive substances of this kind are described, for instance, in my U. S. Patents 1,867,444 and 1,881,180. Other self-hardening acid-proof cements are also known.

Now, it has recently been ascertained that it is very important for the inner lining of pressure apparatus or such apparatus as have an outer metal jacket and are heated externally that the inner lining consisting of acid-proof bricks cemented by acid-proof mortars is from the very beginning under a special pressure in such a way that the bricks are firmly and constantly pressed against the said outer jacket even if the latter is exposed to an intensive expansion owing to high pressure or high temperature.

It will easily be recognized that for preparing such linings there are of particular value such mortars as have a certain regulatable capability of swelling. With the aforesaid ordinary self-hardening water-glass cements which contain such substances as react with alkali, however, a swelling effect of the hardened mortar masses was hardly to be obtained since, owing to the precipitation of the silicic acid proper as binding agent, in most cases, an intense shrinkage occurred on hardening.

Now, I have found that it is possible to exactly regulate the capability of swelling of the above cements by adding thereto small quantities of slags which are obtained in producing and processing metals and metal alloys. There have proved to be especially suitable the slags obtained in the production of iron, that is to say, blast furnace slag, Thomas slag, acid and basic slags or foundry slag whose composition may be characterized by a content of about 30–55 per cent of SiO_2, 15–45 per cent of CaO and 1–25 per cent of $Al_2O_3+Fe_2O_3$. The slags are added to the cement powders in a finely ground state and in a quantity of about 5–20 per cent thereof. The acid-proof mortars are capable of swelling not only in contact with water but also in contact with aqueous liquids such as acids or brines.

The following example serves to illustrate the invention but it is not intended to limit it thereto; the parts are by weight:

A cement powder is prepared by mixing 61 parts of powdered quartz, 4 parts of ground siliceous sinter, 6.5 parts of clay, 2.5 parts of K_2SiF_6, 5 parts of Na_2SiF_6, 1 part of $CaSiF_6$ and 20 parts of powdered blast furnace slag with about 34 per cent of SiO_2, 41 per cent of CaO and 18.6 per cent of $Al_2O_3+Fe_2G_3$. A mortar is prepared by mixing the cement powder with sodium silicate solution, the proportion of Na_2O to SiO_2 to H_2O being 1:2.65:4.66. The hardened mortar mass, when stored in acids, shows a swelling of 1%.

KARL DIETZ.

Published May 11, 1943 Serial No. 380,632

ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF IMPROVED FIBROUS MATERIALS AND THE MATERIALS THUS OBTAINED

Ludwig Orthner, Gerhard Balle, and Heinz Schild, Frankfurt am Main, Max-Otto Schürmann, Dormagen, and Karl Brodersen and Matthias Quaedvlieg, Dessau, Germany; vested in the Alien Property Custodian

No Drawing. Application filed February 26, 1941

The present invention relates to a process of manufacturing artificial fibrous materials and to the materials thus obtained. It is an object of the invention to prepare fibers having an agreeable, soft handle. It is a further object of the invention to impart to the fibers a soft and elastic feel stable to the usual washing operations. The invention especially relates to the process of improving artificial fibrous materials which comprises incorporating in the aqueous spinning solution alkali compounds of sulfonic acid amides containing a saturated aliphatic hydrocarbon radical of at least 8 carbon atoms. In the manufacture of improved artificial filaments from aqueous solutions, e. g. cellulose spinning solutions, such as viscose or cuprammonium solutions of cellulose or protein spinning solutions, alkali compounds are added which are soluble in the said solutions. The alkali compounds are derived from sulfonic acid amides containing a saturated aliphatic hydrocarbon radical of at least 8 carbon atoms. In general the said sulfamides are readily soluble in the alkaline spinning solutions; only in the cases the molecular weight of the sulfamide is extremely high, there is not obtained a clear solution in alkaline fluids, but a suspension or emulsion is formed which may be stabilized by the addition of the usual dispersing agents and which is likewise suitable for the present process. Furthermore, mixtures of sulfamides may be used, for instance mixtures of compounds of high molecular weight and of compounds of lower molecular weight. The aqueous spinning solutions containing alkali compounds of sulfonic acid amides having a saturated aliphatic hydrocarbon radical of at least 8 carbon atoms are spun in the usual way into a known spinning bath containing for instance sulfuric acid and Glauber's salt.

Sulfamides of high molecular weight and their alkali compounds may be prepared in different ways: by transformation of alcohols of high molecular weight into halogen compounds, reaction of the halogen compounds with sodium sulfite to form sulfonic acids and transformation of said acids or their alkali metal salts into the corresponding sulfochlorides or sulfobromides, for instance with phosphorus pentachloride, and transformation of the sulfochlorides with ammonia or primary bases, such as methylamine, ethylamine, butylamine, dodecylamine, cyclohexylamine, aniline, furthermore hydroxyamines, such as ethanolamine, propanolamine, butanolamine or oxethylaniline, into the corresponding sulfonamides. At this synthesis there may likewise be started from alcohols of high molecular weight as they are, for instance, obtained by the reduction of fats and oils, of fatty acids or the like.

Sulfamides of high molecular weight are obtained in a technically especially simple manner by the reaction of sulfochlorides formed by the simultaneous action of chlorine and sulfur dioxide on saturated aliphatic hydrocarbons having at least 8 carbon atoms with ammonia, or amines or hydroxyamines. By the selection of the hydrocarbons or hydrocarbon mixtures serving as starting material, the effect attainable with the sulfamides may be varied to a large extent.

There may be started from hydrocarbons or from mixtures of hydrocarbons which are obtained by fractionating petroleum or from products which are obtained by the hydrogenation of carbon or the reduction of carbon monoxide. These technical products may be freed from any unsaturated portions which may be present, by hydrogenation or refining. The hydrocarbons may be reacted with chlorine and sulfur dioxide with exposure to ultraviolet rays. The hydrocarbons may be used in excess, so that only a part is transformed into products containing chlorine, sulfur and oxygen. The excess of the hydrocarbon may be separated immediately or after the reaction with ammonia or amines.

Sulfamides which are useful for the present process may also be obtained for instance as follows: carboxylic acids having an aliphatic hydrocarbon radical of at least 8 carbon atoms are caused to react with sulfamides containing amino groups, for instance by the condensation of lauric acid with meta-aminobenzene-sulfamide or beta-aminoethane-sulfamide.

The sulfamides herein described may be incorporated in the spinning solutions used for the manufacture of artificial fibers suitably by the addition of an alkaline solution of the sulfamide to the spinning solution, for instance a viscose solution or the solution of cellulose in copper oxide and ammonia. During said operation the solubility or distributability in alkali may be enhanced by the simultaneous use of dispersing agents, such as alcohol-sulfonates, condensation products of carboxylic acids of high molecular weight and amino-sulfonic acids or hydroxy-sulfonic acids or amino-carboxylic acids or hydroxy-carboxylic acids, aromatic sulfonic acids, for instance alkyl-naphthalenesulfonic acids, condensation products from ethylene-oxide and alcohols of high molecular weight, carboxylic acids of

high molecular weight, alkylphenols, alkylcyclohexanols and others. The sulfamide may be added to the spinning solution in any desired phase of its preparation. The alkaline solutions of the sulfamides may also be incorporated without any difficulty to the spinning solutions for casein fibers. The spinning solutions to which the sulfamide has been added are worked up in the usual manner in the usual devices. During the formation or the after-treatment of the threads in the usual acid precipitating bath the sulfamide is separated from its alkaline solution and finely and uniformly subdivided in the thread. During the preparation of casein fibers while simultaneously using sulfamides a reaction of the sulfamide with the formaldehyde moreover probably occurs during the usual hardening operation; a good fixing in the fiber of the substance added is thus attained.

The artificial fibers thus obtained are distinguished by a soft and elastic feel. Owing to the insolubility of the sulfamides in alkali carbonates the incorporated substance imparting softness is not removed from the fiber by the usual washing operations when washing liquids containing sodium carbonate are used. According to the present process artificial fibers are obtained which contain the softening agent not only at the surface; on the contrary, the product imparting softness is uniformly subdivided also in the interior of the fiber. The good subdivision is attained by the fact that the product is present in the spinning solution in the form of a molecular or colloidal solution. If the fiber is formed in the acid spinning bath it is uniformly precipitated in an insoluble form. The softening effect produced is, therefore, more stable than in those cases where the fibers are treated with water-soluble softening agents which are absorbed by the fiber. In that case salts of amines of high molecular weight are frequently used. The free amines are, as is known, insoluble in alkaline spinning solutions and can, therefore, not be incorporated in the same manner as the alkali metal compounds of sulfamides. Furthermore, quaternary ammonium compounds of high molecular weight or other watersoluble bodies are used as softening agents. If the compounds of said kind are already used on spinning it is found that the effect produced is not very resistant to washing operations owing to the solubility in water of the compounds.

The following examples serve to illustrate the invention, but they are not intended to limit it thereto, the parts being by weight:

1. 4000 parts of a viscose solution containing about 5 per cent of cellulose are mixed with a solution in 2N-caustic soda solution of a sulfamide obtained by the simultaneous action of chlorine and sulfur dioxide on a benzine fraction mainly containing saturated aliphatic hydrocarbons and boiling between 240° C and 340° C formed by reduction of carbon monoxide and a subsequent reaction of the aliphatic sulfochlorides formed with ammonia. The solution is spun in known manner into an acid precipitating bath. The fibers obtained are after-treated in the usual manner and dried and are distinguished by an excellent softness and suppleness.

A similar effect is attained by using an aliphatic sulfamide prepared by the simultaneous action of chlorine and sulfur dioxide on a paraffine fraction boiling between 340° C and 380° C and a subsequent reaction with ammonia.

The viscose solutions may also be worked up by a process of spinning by stretching the filament.

2. 100 kilograms of casein are caused to swell at 24° C in 200 liters of water, a mixture of 23 liters of caustic soda solution of 35 per cent strength and 77 liters of water is added and the whole is then diluted with water so as to obtain 550–600 liters of a clear, alkaline casein solution. 5 kilograms of a mixture of sulfamides prepared by the simultaneous action of chlorine and sulfur dioxide on a mixture of paraffine wax formed during the benzine synthesis by the catalytic reduction of carbon monoxide and a subsequent reaction of the sulfochlorides obtained with ammonia is dissolved in 2N-caustic soda solution and the solution is added to the spinning solution. After the solution has been allowed to ripen in the usual manner it is spun into an acid precipitating bath. The filament formed is then hardened in the known manner with formaldehyde. The artificial fibers obtained are distinguished by an agreeable and soft feel.

3. 46 parts of a sulfamide (obtained by the simultaneous action of chlorine and sulfur dioxide on a mixture of hydrogenated hydrocarbons by the reduction of carbon monoxide and boiling between 240° C and 340° C and a subsequent reaction of the sulfochlorides formed with ammonia) are stirred with 9.5 parts of 2N-caustic soda solution, while adding 4.6 parts of the product of the reaction between octadecyl alcohol and 10 mol of ethylene oxide. The whole is diluted with about 300 parts of cold water and stirred into 12700 parts of a solution of 9 per cent strength of cellulose in copper oxide and ammonia. The solution is then spun by a process of spining by stretching the filament so as to obtain artificial silk. The skeins are washed as usual with acid and water, then agitated for 5 minutes in water heated to 65°, centrifuged and dried. The artificial silk thus obtained has a soft feel even without the usual after-treatment with softening agents.

4. 40 parts of a sulfamide (obtained by the simultaneous action of chlorine and sulfur dioxide on a paraffine fraction mainly containing saturated aliphatic hydrocarbons and boiling between 320° C and 380° C and a subsequent reaction of the aliphatic sulfochlorides formed with methylamine) are dissolved in 2N-caustic soda solution. The solution is stirred into 4000 parts of a viscose solution containing about 6 per cent of cellulose. The solution produced is spun in known manner into an acid precipitating bath. The fibers obtained are distinguished, after having been worked up in the usual manner and dried, by a soft and supple feel.

A similar effect is attained by using an aliphatic sulfamide obtained by the simultaneous action of chlorine and sulfur dioxide on the paraffine fraction named above and a subsequent reaction with aniline. The product is suitably dissolved in 1N-caustic soda solution.

5. 4000 parts of a viscose solution containing about 6 per cent of cellulose are mixed with a solution in 2N-caustic soda solution of 8 parts of a sulfamide substantially containing 16 to 18 carbon atoms and obtained by the reaction of a mixture of cetyl alcohol and octadecyl alcohol with thionyl chloride so as to obtain the corresponding chlorides, reaction of the chlorides with sodium sulfite so as to obtain the corresponding sulfonic acid salts, transformation of the sulfonic acid salts with phosphorus pentachloride into the corresponding sulfonic acid chlorides

and finally reaction of the sulfochlorides with ammonia to obtain the corresponding sulfamides. The solution is spun into an acid precipitating bath and worked up as usual. The fibers obtained have a very good softness and suppleness.

6. To 4000 parts of a viscose solution containing about 6 per cent of cellulose there is added an alkaline casein solution prepared by dissolving 40 parts of casein in the corresponding quantity of alkali lye. To the solution thus produced there are added 6 parts of a sulfamide obtained by the simultaneous action of chlorine and sulfur dioxide on a benzine fraction containing saturated aliphatic hydrocarbons and boiling between 230° C and 320° C and the subsequent reaction of the sulfochlorides formed with ammonia. For said purpose the sulfamide is dissolved in 2N-caustic soda solution, while adding 1 per cent of an emulsifying agent, for instance the product of reaction of octadecyl alcohol and 10 mol of ethylene oxide. The spinning solution formed is worked up in the usual manner to obtain fibers which after having been hardened with formaldehyde are distinguished by an agreeable and soft feel.

LUDWIG ORTHNER.
GERHARD BALLE.
HEINZ SCHILD.
MAX-OTTO SCHÜRMANN.
KARL BRODERSEN.
MATTHIAS QUAEDVLIEG.

Published May 11, 1943 Serial No. 381,856

ALIEN PROPERTY CUSTODIAN

TEXTILE GOODS

Bruno Wendt, Dessau, Germany; vested in the Alien Property Custodian

No Drawing. Application filed March 5, 1941

My present invention relates to textile goods, and more particularly to textiles capable of fluorescing when met by ultra-violet light.

It is known to apply to fabrics derivatives of stilbene, especially 4.4′-diaminostilbene-2.2′-disulfonic acid or substitutive derivatives thereof such as benzoylamino- or aminobenzoylamino-derivatives to produce fabrics capable of fluorescing by means of ultra-violet light.

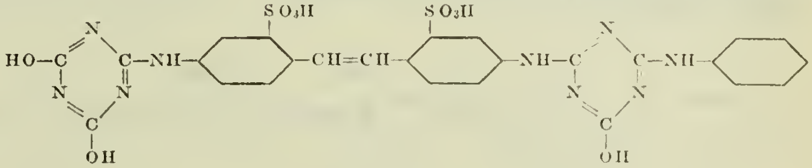
My invention is based on the observation that stilbene compounds colorless or slightly colored and particularly such stilbene derivatives as do not contain free amino groups are especially suitable for the improvement of textiles of any kind as, for instance, fibers, filaments, yarns, or fabrics, knit or felt goods or cloths from animal or vegetable and/or artificial filaments if they contain in their molecule at least one 1.3.5-triazine nucleus. The employment of amino stilbene compounds of this kind has already been proposed in the production of colorless or only slightly colored protective envelopes for goods capable of being affected by light and air.

On a treatment with a solution of 0.001–0,2% strength of stilbene derivatives as defined above even strongly brownish-yellow unbleached textile goods obtain with ordinary daylight the appearance as if they be colored pure-white so that they are closely similar to goods well bleached. Moreover, the strength of the products treated with these stilbene derivatives is not reduced in contrast with the products bleached. The textiles of this invention are also protected from the noxious influence of the ultra-violet rays contained in the daylight. Furthermore, the aminostilbene derivatives having 1.3.5-triazine nuclei are especially strongly absorbed by textile materials and have so strong an affinity to these materials that they cannot be removed by washing; they are also very resistant to alkaline washing liquids. The aminostilbene compounds are also absorbed by artificial textiles as, for instance, cellulose acetate, polymerized vinylchloride or superpolyamides. Finally, the textiles thus treated are more resistant to turning yellow produced by light and therefore keep the white color longer than the aminostilbene derivatives not containing 1.3.5-triazine rings.

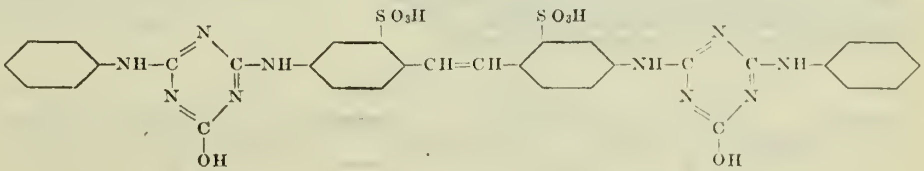
The amino stilbene derivatives of the present invention are preferably applied to the textile materials in the form of water-soluble salts as, for instance, sodium, potassium, or triethanolamino salts in an aqueous neutral or alkaline solution. It is sometimes of advantage to add dispersing or wetting agents to the solution in order to obtain a homogeneous liquid and effect a fast penetrating into the inner layers of the textile material. The stilbene derivatives may, if desired, be added to the solutions or melts of artificial spinning materials. Water-insoluble aminostilbene derivatives of the invention may successfully be employed in the form of an organic solution.

As examples of such aminostilbene derivatives may be mentioned the following compounds:

(1) 4-[2.4-dihydroxy-1.3.5-triazyl-(6)]-amino-4′-[2-hydroxy-4-phenyl-amino-1.3.5-triazyl-(6)]amino-stilbene disulfonic acid-(2.2′) of the following formula:

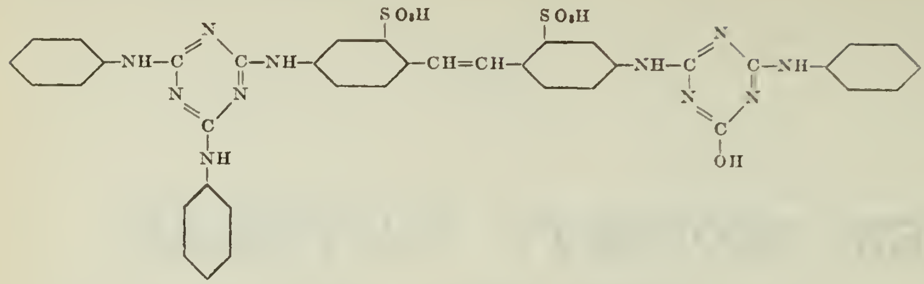


(2) 4.4′-(bis-[2-hydroxy-4-phenylamino-1.3.5-triazyl-(6)])diamino-stilbene-disulfonic acid-(2.2′) of the following formula:

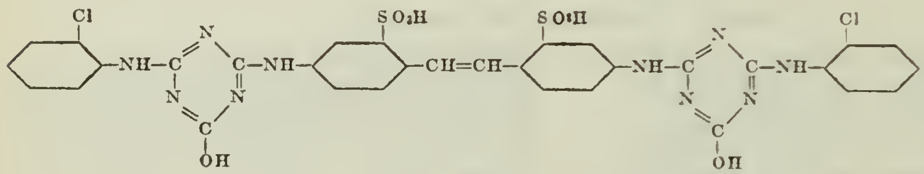


(3) 4-[2.4-bis-phenylamino-1.3.5-triazyl-(6)] amino-4′-[2-hydroxy-4-phenylamino-

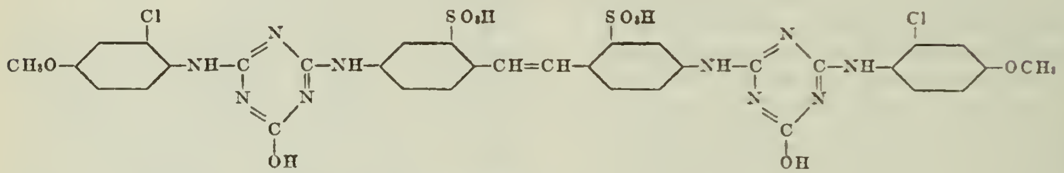
1.3.5-triazyl-(6)]amino-stilbene-disulfonic acid-(2.2') of the following formula:



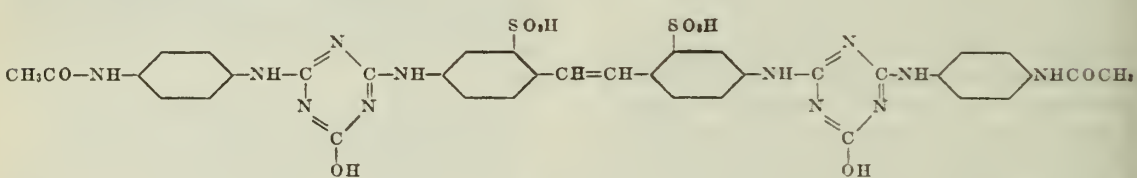
(4) 4.4' - (bis - [2 - hydroxy - 4-o-chlorphenyl-amino - 1.3.5 - triazyl - (6)]) diamino - stilbene - disulfonic acid-(2.2').



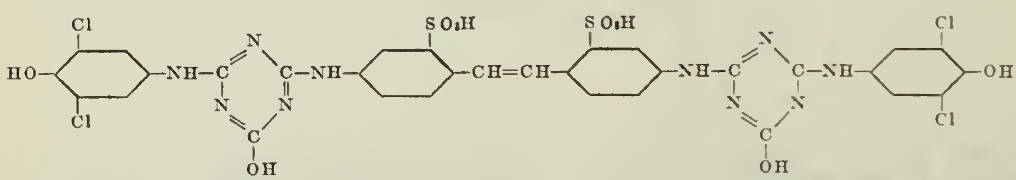
(5) 4.4'-(bis-[2-hydroxy-4-p-methoxy-phenyl-amino-1.3.5-triazyl-(6)]) diamino-stilbene-disulfonic acid-(2.2').



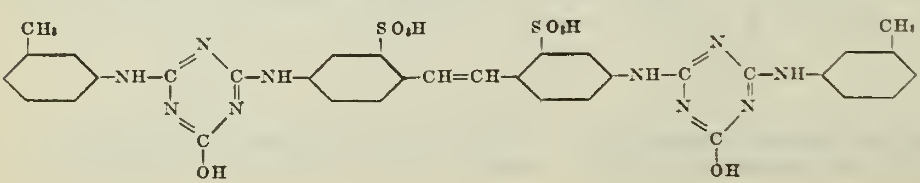
(6) 4.4' - (dis-[2 - hydroxy - 4 - p - acetylamino - phenylamino - 1.3.5 - triazyl - (6)]) diamino-stilbene-disulfonic acid-(2.2').



(7) 4.4'-(bis-[2-hydroxy-4-p-hydroxy-m,m-dichlorphenyl - amino- 1.3.5-triazyl-(6)]) diamino-stilbene-disulfonic acid-(2.2').

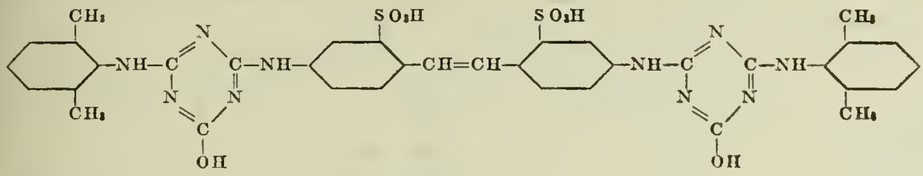


(8) 4.4'- bis - [2-hydroxy-4-m-methylphenylamino-1.3.5-triazyl-(6)]) diamino-stilbene - disulfonic acid-(2,2') of the following formula:



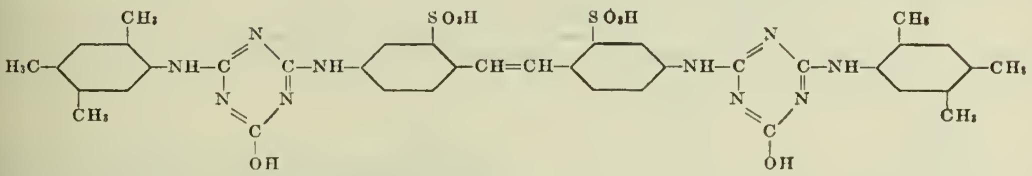
and the isomeric toluidine derivatives thereof.

(9) 4.4′-(bis-[2-hydroxy-4-o,o-dimethyl-phenylamino-1.3.5 - triazyl-(6)])diamino-stilbene-disulfonic acid-(2.2′) of the following formula:

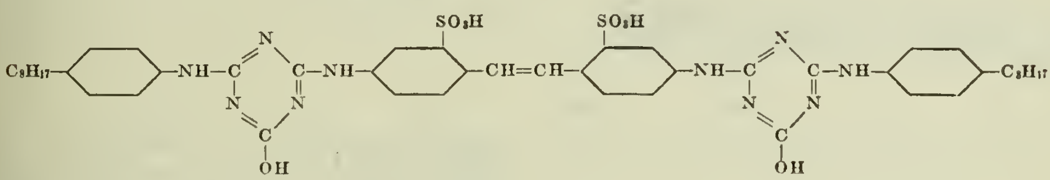


and the isomeric xylidine derivatives thereof.

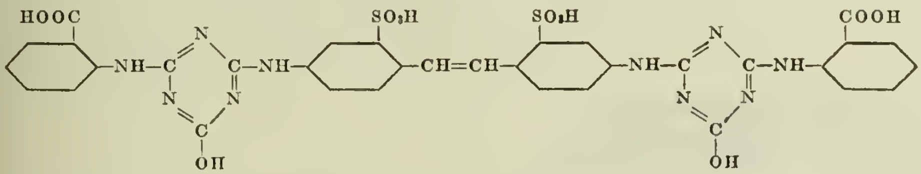
(10) 4.4′- (bis - [2 - hydroxy - 4-(1″.3″.4″-trimethyl - phenyl-amino-(6″)) -1.3.5_triazyl-(6)]) diamino-stilbene-disulfonic acid-(2,2′) of the following formula:



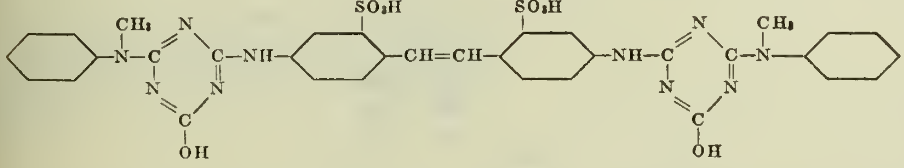
(11) 4.4′-(bis-[2-hydroxy-4- p - octyl - phenylamino -1.3.5-triazyl-(6)])diamino-stilbene-disulfonic acid-(2,2′) of the following formula:



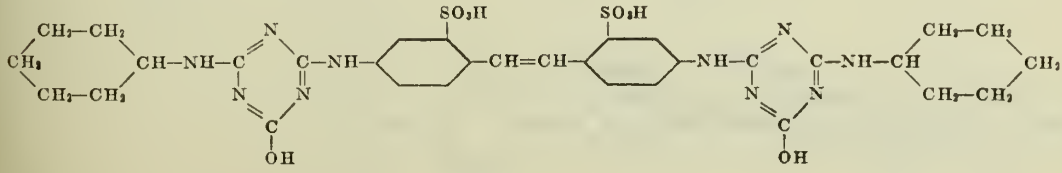
(12) 4.4′-(bis-[2-hydroxy-4-o-carboxy-phenylamino-1.3.5-triazyl-(6)])diamino-stilbene disulfonic acid-(2.2′) of the following formula:



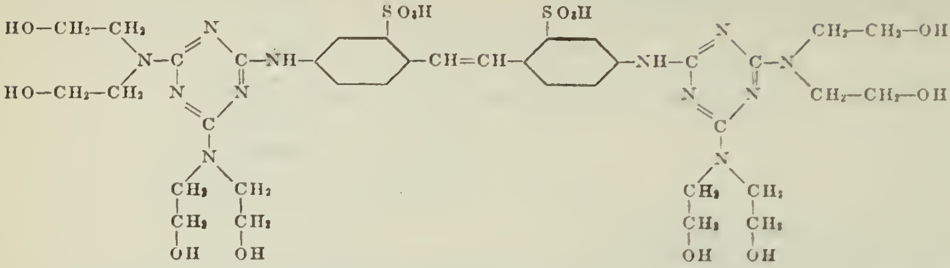
(13) 4.4′(bis-[2-hydroxy-4-N-phenyl-N-methyl - amino -1.3.5-triazyl(6)])diamino-stilbene-disulfonic acid-(2.2′) of the following formula:



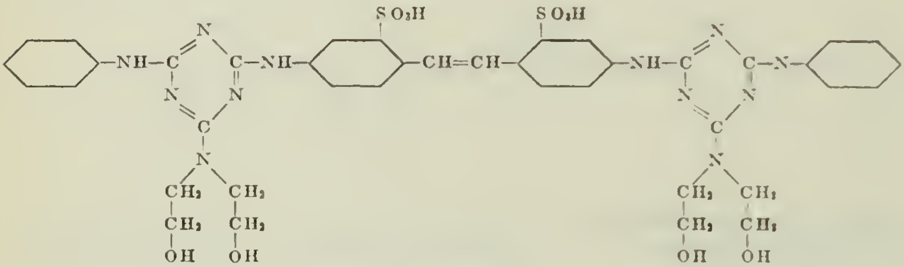
(14) 4.4′-(bis-[2-hydroxy-4-cyclohexyl-amino-1.3.5-triazyl-(6)])diamino-stilbene-disulfonic acid-(2,2′) of the following formula:



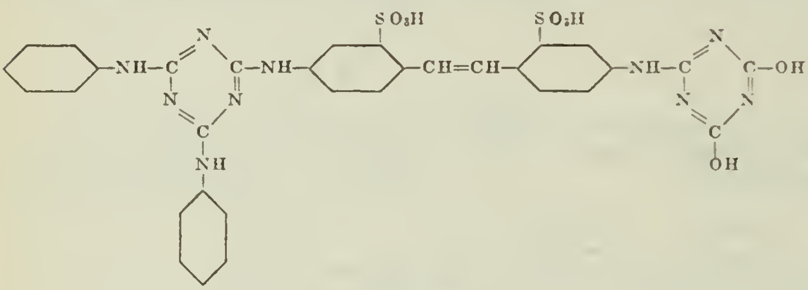
(15) 4.4′-(bis-[2.4-bis-diethanol-amino - 1.3.5-triazyl-(6)]) diamino-stilbene-disulfonic acid-(2.2′) of the following formula:



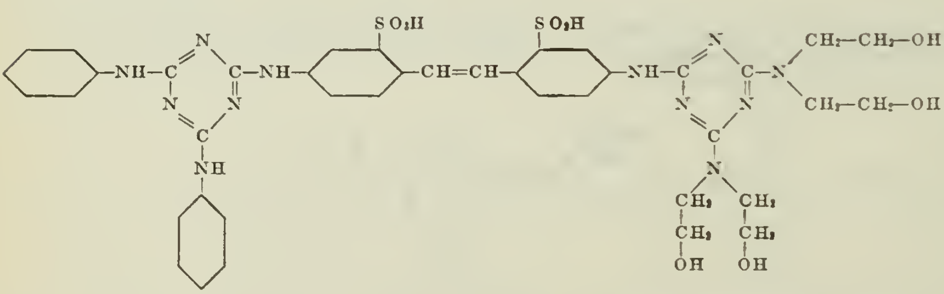
(16) 4.4′ -(bis-[2 -phenylamino- 4 -diethanolamino-1.3.5-triazyl-(6)]) diamino-stilbene disulfonic acid-(2.2′) of the following formula:



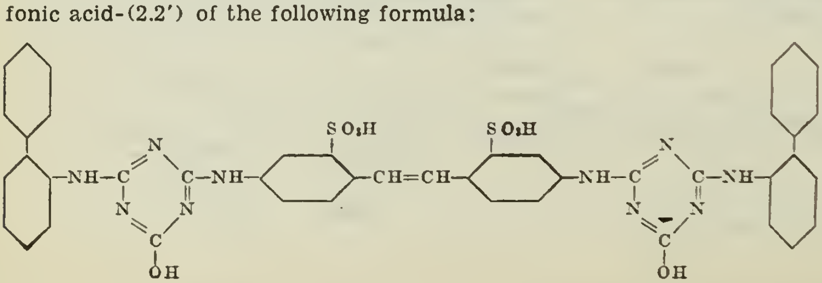
(17) 4-[2.4-bis-phenylamino-1.3.5-triazyl-(6)] amino-4′-[2.4-dihydroxy-1.3.5-triazyl-(6)] amino-stilbene disulfonic acid-(2.2′) of the following formula:



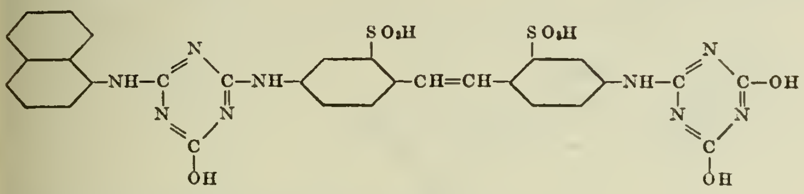
(18) 4-[2.4-bis-phenylamino-1.3.5-triazyl-(6)] amino-4′-[2.4 - bis-ethanolamino - 1.3.5 - triazyl-(6)] amino-stilbene-disulfonic acid-(2.2′) of the following formula:



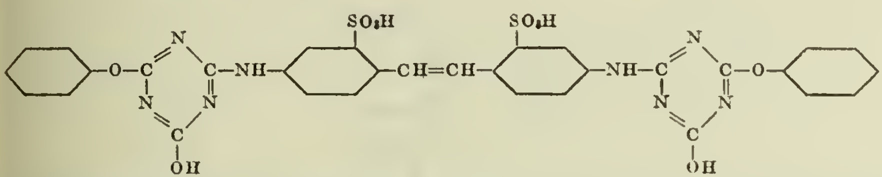
(19) 4.4′-(bis -[2-hydroxy-4-o-phenyl-phenylamino-1.3.5-triazyl-(6)]) diamino-stilbene-disulfonic acid-(2.2′) of the following formula:



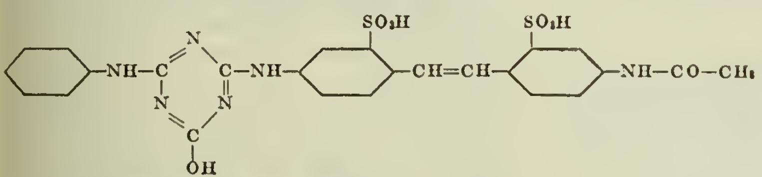
(20) 4-[2- hydroxy-4-α-naphthylamino - 1.3.5-triazyl-(6)] amino-4'-[2.4-dihydroxy - 1.3.5-triazyl-(6)] amino-stilbene disulfonic acid-(2.2') of the following formula:



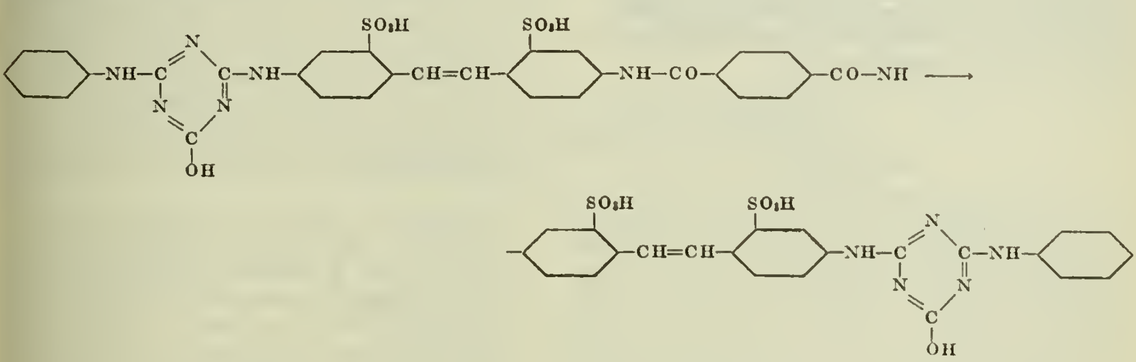
(21) 4.4'-(bis-[2-hydroxy-4-phenoxy-1.3.5-triazyl - (6)]) diamino - stilbene - disulfonic acid-(2.2') of the following formula:



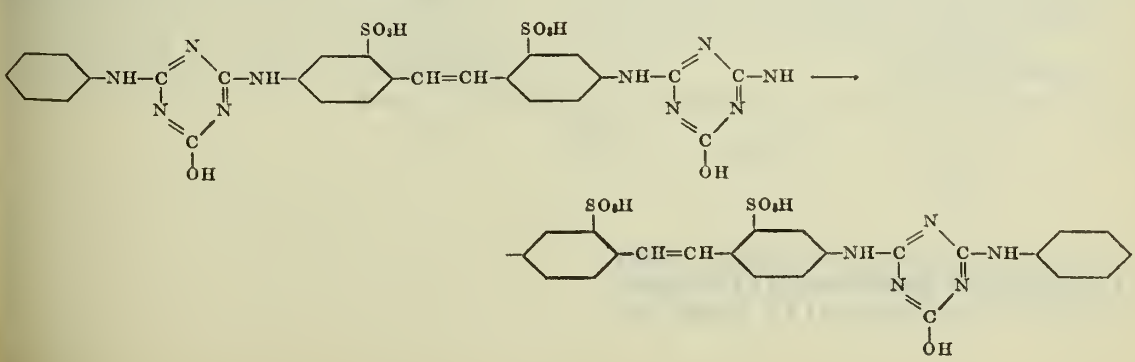
(22) 4-(2 -hydroxy- 4 -phenylamino- 1.3.5 -triazyl-(6))-4'-acetyl - amino - stilbene - disulfonic acid-(2.2') of the following formula:



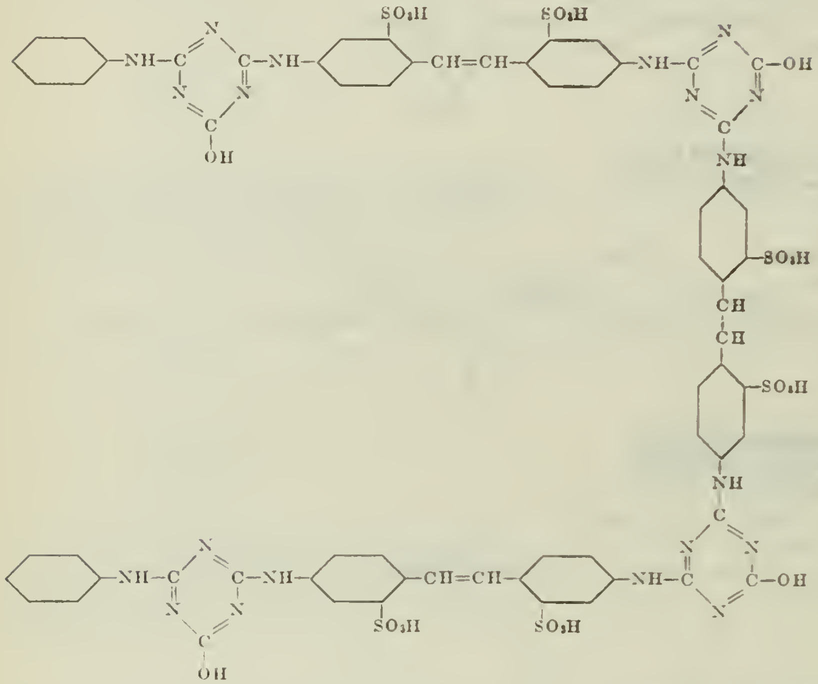
(23) Terephthaloyl - bis - (4-amino-[4'-(2-hydroxy- 4 -phenylamino-1.3.5-triazyl-(6)) amino] stilbene disulfonic acid (2.2')) of the following formula:



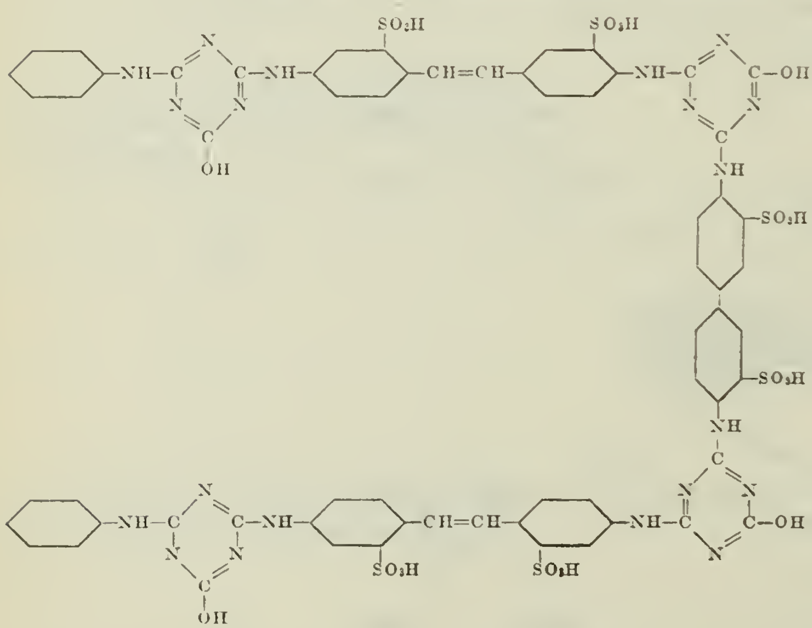
(24) The product prepared by reacting 2 mols of 4-amino-4'-[2-hydroxy-4-phenylamino-1.3.5-triazyl-(6)] amino-stilbene-disulfonic acid-(2.2') with 1 mol of cyanurchloride of the following constitution:



(25) The product prepared by reacting 1 mol of bis-[2.4-dichloro-1.3.5-triazyl-(6)] diaminostilbene-disulfonic acid-(2.2′) with 2 mols of 4-amino-4′-[2-hydroxy-4-phenylamino-1.3.5-triazyl-(6)] amino-stilbene-disulfonic acid-(2.2′) of the following constitution:

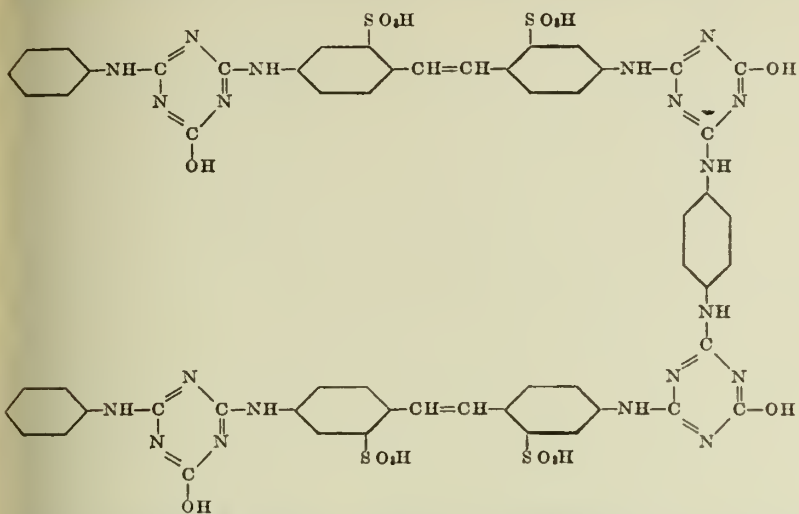


(26) The product prepared by reacting 1 mol of 4.4′-bis-[2.4-dichloro-1.3.5-triazyl-(6)] diamino-diphenyl-disulfonic acid (3.3′) with two mols of 4-amino-4′-[2-hydroxy-4-phenylamino-1.3.5-triazyl-(6)] amino-stilbene disulfonic acid-(2.2′) of the following constitution:



(27) The product prepared by reacting 2 mols of 4-[2-hydroxy-4-phenyl-amino-1.3.5-triazyl-(6)] amino-4′-[2.4-dichloro-1.3.5-triazyl-(6)]

amino-stilbene-disulfonic acid-(2.2') with 1 mol p-phenylenediamine of the following constitution:



These examples are, of course, not to be considered as limitations of the invention. Instead of the 4.4'-diamino-stilbene-2.2'-disulfonic acids, for instance, the 3.3'-disulfonic acids or 2.2'-diamino-stilbene-4.4'-disulfonic acids or 4.4'-diamino-stilbene-3.3'-dicarboxylic acids may also be employed.

Substitutive derivates of such amino-stilbene-sulfonic acids or amino-stilbene-carboxylic acids are also useful as contain only one sulfo or one carboxyl group. The corresponding aminostilbene derivatives having no carboxyl- or sulfonic acid radical are likewise suited if certain solvents as, for instance, organic solvents are used.

Instead of the aromatic, hydroaromatic or aliphatic substituents mentioned above other substituents of this kind may also be employed in the triazine nucleus such as hydrocarbon remainders or the radicals $C_6H_5.S$—, $C_6H_5.SO_2$—. Moreover, heterocyclic substituents as, for instance, aminobenzimidazoles, aminobenzthiazoles, aminoquinolines, and the like and finally such substituents as are fluorescent themselves are useful.

The aminostilbene compounds symmetrical in structure are prepared by causing 1.3.5-triazylchloride dissolved in acetone to react with an aqueous solution of the sodium salt of diaminostilbene-disulfonic acid at a low temperature (about 0–5° C). After the reaction in which the solution has been maintained essentially neutral is complete the amine or phenol is caused to flow slowly into the reaction solution, if necessary, at a somewhat higher temperature (10–30° C). Water-insoluble amines are conveniently dissolved in an organic solvent soluble in water or are used in the form of their water-soluble salts. Finally soda can be added to the mixture and the whole is boiled in order to saponify the chlorine atoms present in the 1.3.5-triazine nuclei.

The unsymmetrical compounds are correspondingly prepared from nitroaminostilbene-disulfonic acid.

The following Examples illustrate the production of the new textile goods.

Example I

100 g of fabric from viscous staple fiber or artificial silk or 100 g of viscous staple fiber in the form of flakes are treated with 3000 g of water containing 1.5 g of the sodium salt of 4-[2-hydroxy-4-β-naphthyl-amino-1.3.5-triazyl-(6)]-4'-benzoylamino-stilbene-disulfonic acid-(2.2') at 80° C for 45 minutes and subsequently dried.

Example II

100 g of a cotton fabric are treated in the same manner as described in Example I.

Example III

100 g of linen are treated in the same manner as described in Example I.

Example IV

A rope of viscous silk disulfurized and unbleached of 100 g is treated in a solution consisting of 3 liters of water and 0.6 g of the sodium salt of 4.4'-(bis-[2-hydroxy-4-phenyl-amino-1.3.5-triazyl-(6)])-diamino - stilbene - disulfonic acid (2.2') at 80° C for 45 minutes and then dried. To the bath 10 to 20 g of sodium sulfate free from water may, if necessary, be added in portions towards the end of the treatment.

Example V

1 kg of the molten polyamide prepared from amino-caproic acid mixed with 0.2 g of the sodium salt of 4.4'-(bis-[2-hydroxy-4-phenyl-amino-1.3.5-triazyl-(6)])-diamino - stilbene - disulfonic acid-(2.2') is worked up into filaments.

BRUNO WENDT.

Published May 11, 1943

Serial No. 380,991

ALIEN PROPERTY CUSTODIAN

GETTER PELLET BOX

Walther Burstyn, Berlin, Germany; vested in the Alien Property Custodian

Application filed February 28, 1941

The present invention relates to getters for evacuating electron tubes and similar vessels and more particularly to the manufacture of a flat box adapted for being filled with a getter pill and for being fixed inside of the tube to be evacuated and for being heated by eddy currents.

An object of the invention is a simple method for manufacturing a sheet metal box of the described kind.

A further object of the invention is a method for manufacturing a box which is easily to be closed by a lid after being filled with the getter pill.

In the accompanying drawing the Figures 1*a*, 1*b*, 2*a* and 2*b* serve for explaning how the lid is deformed in order to close the box. Figs. 3*a* and 3*b* show in cross section one form of the box in open and in closed condition whilst Figs. 4*a* and 4*b* show another construction in plane view and cross section.

The invention is based on the fact that the outer diameter of a convex sheet disc having the form of a cathode **11** (Fig. 1*a*) or a frustrum of a cone **12** (Fig. 2*a*) becomes larger when the disc is pressed flat (Fig. 1*b* and 2*b*).

According to the invention the box is manufactured by pressing into a piece **13** of thin metal sheet a round recess **14** (Fig. 3*a*) the cross section of which is shown on the left side of the figure. The ground of the recess is filled with the flat getter pill **20**. The recess is provided with a projecting edge **15** and on the flat border of it the convex lid **12** is put. Now the lid is pressed flat (Fig. 3*b*) so that it fits closely into the edge **15** and cannot be removed.

The projecting edge **15** may be replaced by a plurality of cogs **16** surrounding the recess **14** according to Figs. 4*a* and 4*b*.

WALTHER BURSTYN.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

W. BURNSTYN
GETTER PILL BOX
Filed Feb. 28, 1941

Serial No.
380,991

Fig. 1a.

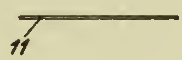


Fig. 1b.

Fig. 2a.

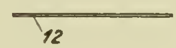


Fig. 2b.

Fig. 3a.

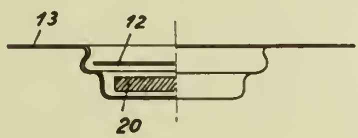


Fig. 3b.

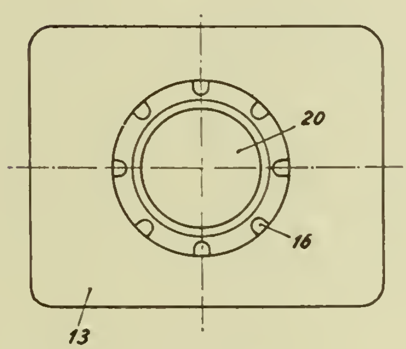


Fig. 4a.

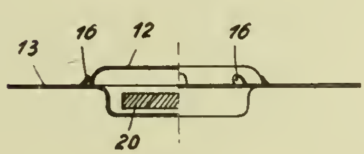


Fig. 4b.

Inventor:
Walther Burnstyn

Published May 11, 1943 Serial No. 382,094

ALIEN PROPERTY CUSTODIAN

METALLIC COATING

Jean Loiseleur, Paris, France; vested in the Alien Property Custodian

Application filed March 6, 1941

The present invention concerns a method for obtaining, through a wet method and in the absence of an external source of electric current, a very adhesive deposit of a metal which is electropositive with respect to hydrogen in the electromotive series of the metals (such as mercury, bismuth, gold, silver, copper, antimony, rhodium, palladium, osmium, platinum, etc.) upon surfaces such as polished metal, glass, ceramic materials, mica; sheets, thin bands, films and threads of cellulose, cellulosic esters and ethers and other derivatives of cellulose, polymerized resins, varnishes, gums, rubber, ebonite, or other organic plastic materials of various kinds, such as urea resins, acetals, formaldehyde resins, phenolic resins such as Bakelites, albuminous compounds, such as leather, ordinary or tanned gelatine, casein, or any other albuminoid.

The method according to the present invention includes three steps:

1. Bringing the surface to be metallized into a state in which it is capable of adsorbing a molecular layer of ions;

2. Causing a molecular layer of ions to be adsorbed on the surface thus prepared, by immersing it into an alkaline solution of a metallic salt, said solution being free from any reducing agent, and by freeing it then from any excess of ions (for instance by washing with distilled water), so that the surface, which remains merely covered by a molecular layer of ions adhering strongly thereto, owing to the adsorption forces, is ready for the third step;

3. Performing upon the ionic layer which has just been obtained the metallic deposit proper. As a matter of fact, the preceding preparation of the surface has given the remarkable result of rendering said surface capable of receiving in an adherent and satisfactory manner any metallic deposit formed by treating said surface by the known and usual solutions, such as those currently employed for silvering and gilding looking glasses. But, in a general manner, and for the whole of the matters above mentioned, this metallization can be performed, according to the present invention and in an advantageous manner, through a new method which consists in pouring a solution containing, together with a ferrous salt and hydroxy acid, the alkaline solution of a salt of the metal to be deposited, this last mentioned solution having been brought, through a preliminary treatment, to the lowest possible state of oxidation.

In the case of metallic surfaces, and also in that of glass, ceramic matters, or mica, the first part of the method consists in scouring, cleaning, and freeing from any traces of oxides the surface to be metallized, according to known processes, and preferably keeping the surface in contact with pure water subsequent to the cleaning step.

In the case of the other surfaces, constituted of organic matter and which are capable of admitting, under certain circumstances, a certain degree of imbibition, the first step of the method consists in an imbibition of the surface intended to permit a penetration of the layer of ions produced in the second part of the treatment and to improve the adhesion of the final metallic deposit. This imbibition is carried out by passing the matter to be treated through one or several successive baths, consisting, in a general manner, of an aqueous solution of a solvent of this matter. This solvent may be either a metal salt, such as zinc chloride, cupro-ammoniacal solutions, or the like, or an alcohol, aldehyde, ketone, organic acid, etc., that is to say any body miscible either wholly or partly with water and having also the property of dissolving more or less in the material that is treated. It is an essential condition that the solvent should be free from any reducing action on the metallic solutions employed in the second and third steps of the method. For instance, in the case of cellulose acetate, it is necessary to make use of quinone, and not hydroquinone, because the last mentioned body, which might also imbibe cellulose acetate, would at the same time give it reducing properties, which would prevent the subsequent formation of an adhering metallic deposit under the conditions of the method. When it is desired to treat a film of cellulose acetate for instance, it is left for some minutes in a solution of quinone preferably of a concentration of from 10 to 15 grams per thousand grams of water, and, after washing, it is immersed for some minutes into a cupro-ammoniacal bath, containing for instance one quarter of a molecular weight of $Cu(OH)_2$ and 2 molecular weights of NH_4OH per liter. It is clear that the choice and the concentration of these baths depend upon the nature of the matter to be treated and that duration of the treatment can be varied at will by modifying either the concentration or the temperature of the baths.

The second part of the method is a purely ionic treatment and it serves merely to bring the surface to be metallized into a particular physico-chemical state, that of metallic colloid ions characterized by a negative polarity and a suitable electric charge. This treatment, which is necessary for the subsequent obtainment of an even and adhesive metal deposit, consists in treating the surface to be metallized with an alkaline solution of a metallic salt. This solution may consist: either of an alkaline solution of the ion that will be deposited in the subsequent metallization, or, preferably, and this whatever be the nature of the metal that will be subsequently deposited (case of the metallization by antimony, for instance) of a highly diluted solution of gold, platinum, or silver hydrate. In

this latter case, it is advantageous to perform a preliminary washing of the surface with a stannous solution, followed by an abundant washing with water. The contact of the surface with the solution of gold, platinum or silver hydrate lasts for some seconds (for instance from 30 to 90 seconds), this period of time being sufficient for forming the adsorption layer. This treatment is always followed by a treatment intended to remove any excess of ions, for instance by washing with distilled water. At this time, the layer of ions covering the surface of the glass is characterized by its very small thickness, which averages the dimensions of the molecule (that is to say from 10^{-7} to 10^{-8} centimeters). Therefore this layer has no reflecting power and it will have no effect in the appearance of the subsequent metallization. Furtherfore, this layer does not have sufficient conductivity for the eventual obtainment of a galvanic deposit. Finally, the cost of the metal that is employed is negligible, since a gram-molecule (of gold for instance) is theoretically sufficient for forming a mono-molecular layer of adsorption over an area of 40 hectares or 400,000 square meters: for depositing for instance a layer of gold ions, I employ a pure solution of auric hydrate containing about $\frac{1}{1000}$ of a gram-molecule of gold per litre.

The foregoing steps of contacting the surface with a dilute solution of a metallic ion are always performed in the absence of any reducing agent and as a result no metallic precipitation or deposit occurs, and the adsorbed layer has no metallic character.

The third step of the process consists in the metallization of the surface thus prepared. A particularly advantageous way of performing this operation, according to the invention, consists in pouring as a whole onto the surface thus prepared a solution containing together with a ferrous salt and in the presence of an hydroxy-acid, an alkaline solution of a salt of the metal to be deposited, this last mentioned solution having been brought, through a suitable treatment, into the lowest possible state of oxidation, and this preferably by means of a hydrosulfite or its formaldehyde derivatives, or of a ferrous salt.

In order to reinforce the layer of metal which has just been formed in the course of the third step of the treatment, I may, after having left the metallization solution for a certain time on the surface to be metallized, allow it to drip without rinsing, then cause a new metallization solution identical to the first one to act for the same period of time, and finally rinse with water.

By way of non-limitative example, I will now describe embodiments of the invention for the gilding of copper, for depositing metallic antimony on glass and for silvering and coppering a film of cellulose acetate.

In order to gild a surface of copper, the surface is cleaned with benzine, then immersed for some minutes in a dilute solution of stannous chloride. After washing, the surface is immersed in a solution of silver hydrate of thousandth-molecular concentration. After washing, the surface is left in a bath constituted of:

AuO_3Na_3	2 gm. per 1000
Gluecose	0.25 gm. per 1000
Levulose	0.25 gm. per 1000
Sodium tartrate	0.025 gm. per 1000

at a temperature kept between 40 and 50° C.

After drying, the gold deposit is capable of receiving a fine polish under the action of a soft leather.

In order to form a deposit of bright metallic antimony on glass, I make use of a metallization solution prepared in the following manner (quantity corresponding to the metallization of an area of 100 square centimeters); adding successively:

	Cc.
Solution of antimony trichloride D° 1.38	6
Tartaric acid 15 gm. NaOH (big grains) 12 gm. NH_4OH of 20 per cent 40 cc. Water Q. S., 250 cc.	24
Rongalite, 153 cc. Water Q. S., 1000 cc.	27
Mohr salt (ammoniacal ferrous sulfate) 255.48 gm. Commercial formaldehyde of 35 per cent 65.17 cc. Water Q. S., 1000 cc.	30

This metallization solution is poured onto the glass surface which will have undergone, in the meantime, the treatments above mentioned for forming the ionic layer.

For this purpose, the glass surface has been perfectly cleaned according to known processes (for instance by means of rouge and then with diluted hydrofluoric acid). It is then left for some minutes in contact with a dilute solution of stannous chloride then washed with distilled water. The glass surface is then brought into contact with a solution of thousandth-molecular gold hydrate (for 90 seconds). I wash with distilled water. The glass surface, which is now provided with its ionic layer is finally brought into contact with the metallization solution. In the particular case of metallization by means of antimony, it is advisable to gradually raise the temperature. A short time before boiling takes place, the deposit of antimony becomes apparent, coating the glass surface with an adherent and thick dazzling layer of metallic antimony, whereas the solution remains clear.

It should be noted that if the same metallization solution had been brought into contact, under the same conditions, with any glass surface perfectly clean but not having undergone the ionic treatment according to the present invention as above explained, the glass surface would not have been metallized, the solution being clouded by the production of antimony muds. Carried out on a test tube, the metallization according to the present invention permits of manufacturing antimony electrodes for measuring the pH in a very easy manner.

In the case of the silvering of a film of cellulose acetate, the film is first treated to ensure that it is perfectly clean.

The film is immersed at a temperature of 25° for five minutes in a solution of quinone of fifteen grams per thousand grams of water. After washing with ordinary water, the film is immersed, for five minutes, in a solution containing one quarter of a molecule of $Cu(OH)_2$ and two molecules of NH_4OH, at a temperature of 25°.

After washing in ordinary water, and then in distilled water, the film is immersed into a stannous solution corresponding to one tenth of a molecule (advantageously, I may add to this solution about five parts per thousand of one of the bodies above referred to as capable of facilitating imbibition, preferably phenol in this case), washed, immersed into a solution of auric hy-

drate of N/1000, and washed with distilled water. Attention is called to the fact that, at this time, the film has no reducing property of its own. Its surface is then merely prepared from a physicochemical point of view, and is immediately covered with an adherent deposit of silver as soon as it is immersed in the metallization bath, the composition of which is analogous to that of baths utilised for silvering looking glasses (for instance ammonical silver hydrate and glucose).

If, instead of silvering a film it is desired to coat it with copper, the silver metallization bath is replaced by the following solution:

Tartaric acid	grams	1.08
NaOH	do	0.9
Crystallised copper sulphate	do	3.24
Ammonia (20%)	cubic centimeters	3
Rongalite (formaldehyde-hydrosulfite)	gms	0.99
Ammoniacal iron sulphate (Mohr's salt)	gms	2.93
Commercial formol	cubic centimeters	0.747
Water Q. S. for	do	36

The solution is allowed to act for about fifteen minutes at the ordinary temperature, to wit for instance from 20 to 25° C.; then it is washed thoroughly and dried.

The accompanying drawing is an enlarged and diagrammatic sectional view of a metallized article obtained through the method according to the present invention, **1** being the material to be metallized, **2** the ionic molecular layer, and **3** the deposit of metal.

The relative thickness shown on the drawing for the layers of the different materials is far from what it is in reality, as, for example, the thickness of the layer **2** runs around 10^{-7} cm. whereas the plate **1** has at least several tenths of a millimeter.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient examples of the method according to the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made therein without departing from the principle of the present invention.

JEAN LOISELEUR.

PUBLISHED

MAY 11, 1943.

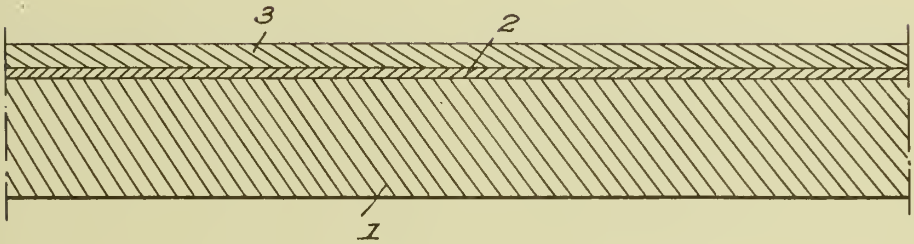
BY A. P. C.

J. LOISELEUR

METALLIC COATING

Filed March 6, 1941

Serial No.
382,094



Inventor
JEAN LOISELEUR

By Dorsey Cole & Garner

Attorneys

Published May 11, 1943 Serial No. 382,101

ALIEN PROPERTY CUSTODIAN

REFRACTORY PRODUCTS

Georges Passelecq, Paris, and Alexis Sémenoff, Villers St. Paul, France; vested in the Alien Property Custodian

No Drawing. Application filed March 6, 1941

Refractory products are generally obtained by mixing in presence of water a more or less finely granulated chamot, obtained by baking at high temperature raw materials apt to produce refractory products, with a binding agent, which, in most cases is of an inorganic nature; the mass resulting from this mixture is then transformed, by means of a pressure over pressure or modelling by hand or pneumatic hammer, into bricks or articles of the desired shape, which are dried and baked at high temperature. It has to be endeavoured in this manufacture, to use as little water as possible, because the evaporation of the water during the drying and the baking causes the formation of pores which decrease the density of the finished products; but it is not possible to lessen that quantity under a certain limit, limit determined for a given refractory composition, as otherwise the mass could no longer be moulded or modelled.

Now, we have found, according to the present invention, that the manufacture of refractory products was facilitated and that the physical and mechanical properties of the finished products was increased when the basis refractory material, constituted of a solid element having a high melting or softening point, was mixed, without emulsifying with air, with the binding agent in the presence of an aqueous solution of a wetting and dispersing agent, the solution containing either the binding agent or part of the latter if it is soluble or partially soluble in water.

Materials having a high melting or softening point which can be used for the realisation of the present process are generally all those which are used in the manufacture of refractory products, such as, for instance, oxides of silicium, of zirconium, of thorium, of beryllium, of aluminium, of magnesium, of chromium, the silicon hydrocarbon, the natural or artificial refractory silicates, for instance the aluminium silicate, the carbon, or the mixtures or natural combinations of these materials either together or with other materials.

The binding agents can be of inorganic or organic nature or composed of mixtures of substances of these various natures. Lime, silicates, clay, boric acid, phosphoric acid, magnesium chloride can be mentioned as inorganic binding agents, as well as all those used in the refractories industry. It has besides been found that it was possible to obtain particularly advantageous results in the application of the above mentioned process by incorporating to the binding agent used, or by using as binding agent itself, a small proportion of bibarytic silicate. The latter forms, indeed, during the baking operation, with the constituents of the mixture which has to be agglomerated, complex silicates which have high melting points, and act as a cement joining very firmly together the particles of the material which has to be agglomerated. On account of the own refractory strength of the silicates thus formed and of the fact that the presence of a wetting and dispersing agent permits, by facilitating the repartition of the binding agent in the mass which has to be agglomerated, to decrease to a minimum the proportion of bibarytic silicate to be introduced in that mass to obtain the desired binding—and as a consequence the proportion of complex silicates formed—, it is possible to obtain agglomerated bodies which, while having a high mechanical resistance, have a resistance to the heat almost of the same kind as that of the refractory material which has been used to compose them. Generally an addition of 0.5 to 4% (five tenth to four per cent) of bibarytic silicate by weight with respect to the mass which has to be agglomerated, will be sufficient to obtain good results. Dextrin, glues, albuminoids, residual lies of the sulphitation of cellulose materials, alginates, pitches, tars, for instance as emulsions or dispersions in a liquid, for instance water, linseed oil, natural or synthetic resins can be mentioned as organic binding agents. Pitches and tars are advantageously introduced as colloidal suspensions or aqueous emulsions. In that case the wetting and dispersing agent is used as emulsifying agent for the formation of the aqueous emulsion or suspension of pitch or tar.

By wetting and dispersing agent, it has to be understood a product which facilitates the mutual dispersion of the solid material and of the aqueous solution. Such products are, i. e. the products of condensation and sulphonation of aromatic hydrocarbons and their derivatives with the aldehydes, the alcoyl and aralcoyl-naphthalene sulphonates, the sulphonated derivatives of the fatty bodies, of the fatty alcohols, of the fatty acids, of the amids of fatty acids, of the esters of fatty acids, the products of the sulphonation of the residues of the distillation of the benzoic aldehyde, the substance soluble in water resulting from the action of the ethylene oxide on bodies insoluble in water and containing a reactive hydrogen and other similar substances. The alkaline alginates and the residual lies of sulphite cellulose, which have also a certain dispersing power, have already been used as bind-

ing agents in the refractories industry. Nevertheless, the use of these substances as dispersing agents, according to the present invention is also taken into consideration. In this case, in reality, they will be used in concurrence with one or several appropriated binding agents used as such, and in much lesser proportions than when they are themselves used as binding agents (i. e. in proportion of about 0.2 to 2% of the total weight of the refractory mass), that is to say in such conditions that they should effectively have the function of dispersing agents between the aqueous solution and the solid material and be unfit to fulfill the function of binding agents as in their previously known uses.

By using wetting and dispersing products of the aromatic series having a high wetting power as well as high dispersing properties, without giving rise to an important formation of foam—such as, for instance, neutralised products of condensation and sulphonation of phenols, of naphtaline, of chloronaphtalenes, of anthrasene with aldehydes, of products of condensation of sulphonic naphtalene acids with formol, of neutralised products of sulphonation of sulphite phenols—it is possible to realise an excellent agglomeration with comparatively reduced proportions of emulsion or suspension of pitch or tar, which is advantageous from the point of view of the quality of the refractory products obtained as well as from the point of view of the economy realised in the manufacturing. The pitch or tar incorporated to the refractory mass, forms, indeed, during the baking, a coke net work which maintains the agglomerated mass, up to its prefusion, but disappears afterwards by combustion; the smaller the proportion of pitch or tar introduced, the smaller will also be the porosity of the products after this disappearance.

The preparation of pitch or tar emulsions can be made in a very simple way. For the tar, it is possible to proceed by adding to it, in the cold and by small portions, the wetting and dispersing agent to which a certain proportion of water has been added, while the mixture is submitted to a mechanical shaking or an air insuflation, and by finally introducing—with stirring—the complementary quantity of necessary water. For the pitch, it is possible to use solid pitch and to crush it, in the cold and in presence of the quantity of water in which it has to be emulsified, water to which the wetting and dispersing agent has been added. It is also possible to heat the pitch at a temperature not above 80° C., to flow in, while stirring, the wetting and dispersing agent to which water has been added and which has been heated to a temperature of about 70° C., then the complementary quantity of water also heated at 70° C. It is moreover possible to use the pitch as a solution, for instance in light fractions of tar, in which case the preparation of the emulsion is made as it is mentioned here above in the case of tar.

It is also possible to use an emulsion composed of pitch and tar; in that case an emulsion of pitch (in the cold or in the heat) and an emulsion of tar are prepared separately. They are then mixed.

To increase the stability of the emulsions, it may be advantageous to introduce in them small proportions of a stabilisator, such as, for instance, the casein, preferably little alkalinised, the albumin of the blood or an alkaline resinate.

In all cases, it is good that the wetting and dispersing agent used according to the invention should be chosen in such a way that its properties will not unfavourably be influenced by the presence of a constituent of the refractory material; i. e. when the lime is the binding agent, a wetting and dispersing agent stable to the lime salts has to be chosen.

For putting the invention into practice, a non-foaming paste is preferably formed with the refractory material or materials, the binding agent or agents and the aqueous solution containing the wetting and dispersing agent and eventually the binding agent or part of it; it is of course possible to add other products to the composition of the paste in order to modify the properties of the finished products. This paste is modelled or moulded at a compression sufficient for the agglomeration; the articles obtained are dried and baked according to the normal technique.

The process which is the object of the invention permits to decrease the quantity of water used in the manufacturing of refractory products and therefore to manufacture products having a high density, a small porosity and a high mechanical resistance. Compared to refractory products obtained without wetting and dispersing agent, all other conditions being similar, the refractory products, according to the invention bear with more load at high temperature, have a better resistance to abrasion and a reduced penetration to the slag; as a consequence of their higher density, they will, under a similar volume, take in more calories and are therefore especially recommended for the filling of heat regenerators.

A particularly interesting method of carrying out the process which is the object of the invention consists to use as binding agent, a solution containing organic cold-binding agent, an organic hot-binding agent and a wetting and dispersing agent. By organic cold-binding agent it has to be understood an organic product capable, in aqueous solution or emulsion, to stick together at low temperature and especially at the atmospheric temperature, the particles of refractory materials in a way sufficient to permit the handling of the agglomerated body; such materials are, for instance: the dextrin, the glues, the casein, the natural or artificial resins. By organic hot-binding agent it has to be understood an organic product capable of being converted into caramel or coke at high temperature and which is consequently capable to unite together the particles of refractory materials by means of a kind of coke net work; such products are, i. e. the monoses, polyoses, sugars, molasses, raw products soluble in water coming from the hydrolysis of the wood. The thus obtained mixture of organic binding agents can be used alone or in concurrence with an inorganic binding agent.

When this method of carrying out is employed without inorganic binding agent, it is possible to obtain refractory products composed almost only of refractory materials. The organic binding agent gives rise, from about 500° C. up, to the formation of a sort of extremely fine coke net work which keeps its shape to the article during a certain phasis of the baking, this phasis being situated in an interval starting at the cokefying of the binding agent; this coke net work permits the evacuation, by capillarity, of the steam or of the gases coming from the eventual decomposition of certain components of the raw products and avoids the formation of pores in the mass, without however making particu-

larly porous finished articles, because, according to the invention, the addition of the wetting and dispersing agent decreases the porosity in a greater proportion.

Nevertheless, in this same method of carrying out, when the wetting and dispersing agent produces a persistant foam, it is possible according to modification of the present invention, to form by thorough shaking or introduction of air, or by these two means, a stable emulsion of refractory materials, of organic binding agent and of air; the drying in moulds and the baking of the thus obtained foam, produces light and porous refractory products which are particularly suitable when it is desirable to decrease the weight of the refractory body or to obtain at the same time a calorifugal action. This result is notably obtained when saponine is used as a wetting and dispersing agent.

It has besides been found that, when the wetting and dispersing agent contains an alkaline metal under a combined form, i. e. in the case of an alkaline sulphonate, the application of the process which is the object of the invention permits to realize a kind of self-agglomeration of the refractory product at the temperature of the baking, whether the traces of alkaline oxides, (i. e. 0.02 to 0.05%) uniformly distributed on all the surfaces of the refractory particles owing the action itself of the wetting and dispersing agent, give rise to the superficial formation on these particles of alkaline silicates which join together the said particles, whether they determine a softening of the surfaces of contact of the refractory particles. If the wetting and dispersing agent contains no alkaline metal, it is possible to add to the binding solution a very small quantity of the compound of an alkaline metal; inversely, if the refractory contains no silica or silicates, it is possible to add to the initial mixture a very small quantity of a siliceous material such as crushed quartz.

Finally, the pitch or tar emulsions can be used for the agglomeration of refractory materials without the adjunction of any other binding agent, under the condition however, that, in case of solid pitch emulsions or suspensions the mixture of refractory materials should be submitted, before or during the moulding, or after it, to a temperature of 80° C to 100° C capable to bring the pitch to a state at which it possesses a binding power sufficient to permit further manipulations of the agglomerated bodies. It is also possible to use these emulsions or suspensions in concurence with a substance playing the part of cold-binding agent, according to the method of carrying out described above in which a cold binding agent and a hot binding agent are used simultaneously. The emulsion or suspension of pitch or tar composes then the hot-binding agent; as cold-binding agents it is possible to use, as said above, for instance, the dextrin, the glues, the gums, the casein, the natural or synthetic resins. On the other hand, if the emulsion has a sufficient binding power at low temperatures, but insufficient at high temperatures—which can be the case, for instance, of tars of a feeble content of pitch—it may be interesting to use that emulsion in concurrence with a material capable to act as hot-binding agent. It has been indicated above that it was possible to use, for fulfilling this condition, a certain number of materials, such as, for instance, the monoses, polyoses, sugars, molasses, as well as, notably, the raw products, soluble in water coming from the hydrolysis of the wood. In the various cases which have been considered, the complementary binding agent can be incorporated to the emulsion of pitch or tar during its preparation, or brought itself to the state of an emulsion or solution which is added to the emulsion of pitch or tar separately prepared.

In addition to the cases which have been mentioned, where it can be interesting to use the emulsion of pitch or tar with a complementary hot or cold-binding agent, it has been found, according to the present invention, that a particularly advantageous possibility was the use, as binding agent for the manufacture of refractory products, of an emulsion of pitch or tar, in connection with a fatty refractory clay, such as, for instance, the clay of Sézanne (Marne). The incorporation to the emulsion of pitch or tar of such a clay, permits to reduce notably the quantity of tar or pitch necessary to obtain the wanted cohesion at the various temperatures of manufacturing and use.

In the following non limitary examples, the parts by volume are taken so that, in the case of water, one part by volume is equal to one part by weight.

Example 1

90 parts by weight of mullite chamot granulated at the standard size,
10 parts by weight of white bauxite of high contents of alumina,
5 to 7 parts by volume of water in which 0.4 part by weight of the sodium salt of a sulphonated condensation product of naphtaline with formol, for instance of the product commercially known as "Diastersol NDS", had been dissolved,

were mixed together.

The mixture was moulded and baked at 1500° C. The thus obtained refractory bodies had a porosity inferior to that of the refractory bodies manufactured without the use of a dispersing agent.

Example 2

90 parts by weight of dead burnt magnesia chamot,
10 parts by weight of caustic magnesia sifted through a sieve of 200 meshes per sq. inch, and
5 parts by volume of water in which 0.4 parts by weight of butylnaphtalene-natrium sulphonate had been dissolved,

were mixed together.

The work was carried out as in the above example and similar results were obtained.

Example 3

100 parts by weight of mullite chamot suitably granulated, and
5 to 7 parts by volume of an aqueous solution containing, per litre,
- 250 gr. of dextrin,
- 250 gr. of molasses, and
- 50 gr. of the sodium salt of a sulphonated condensation product of naphtaline with formol, for instance of the product commercially known as "Diastersol NDS",

were mixed together.

The mixture was moulded and baked at 1500° C; the thus obtained refractory body was essentially composed of self-agglomerated mullite.

Example 4

100 parts by weight of dead burnt magnesia chamot containing less than 4% of Fe_2O_3, and of appropriated granulometry, and
5 parts by volume of the solution used as in Example 3,

were mixed together.

The mixture was moulded according to the technique of over compressed refractory bodies and baked at 1500° C. Magnesia bricks were obtained having a density of 3 to 3.15, an apparent porosity in volume of 11 to 15% and the absorption of water of which by weight was of 3.75 to 4.75%.

Example 5

200 parts by weight of zirconium oxide chamot of a granulometry of 0 to 0.5 mm,

were mixed with

20 to 25 parts by volume of an aqueous solution containing, per litre,
200 gr. of dextrin,
100 gr. of molasses, and
200 gr. of butylnaphthalene-sodium sulphonate.

The mass was thorough shaked, up to the formation of a persistant foam, then placed in moulds of the desired shape, cautiously dried in the open air or in a drying oven at a temperature below 100° C and baked at 1500° C. Bricks of an apparent density of 1.25 to 1.50 were obtained.

Example 6

94 parts by weight of dead burnt magnesia chamot,
4 parts by weight of caustic magnesia sifted through a sieve of 200 meshes, and
2 parts by weight of bibarytic silicate,

were mixed with

5 parts by volume of water in which 0.4 part by weight of butylnaphthalene-sodium sulphonate had been dissolved.

The mixture was moulded and then baked at 1500° C. The refractory bodies obtained had a porosity inferior to that of refractory bodies manufactured without dispersing agent.

Example 7

98 parts by weight of zirconia chamot (oxide of zirconium), and
2 parts by weight of bibarytic silicate,

were mixed with

4.5 parts by volume of water in which 0.25 part by weight of a sodium salt of a sulphonated condensation product of naphthaline with formol, commercially known as "Diastersol NDS" had been dissolved.

Work was carried out as in Example 6.

Example 8

96 parts by weight of dead burnt magnesia chamot,
3.5 parts of bibarytic silicate, and
5 to 7 parts by volume (according to the granulatory of the chamot) of water in which 0.5 part by weight of dextrin and 0.25 part by weight of "Diastersol NDS" had been dissolved,

were mixed together.

The mixture was moulded and baked at 1500° C as in Example 6.

Example 9

94 parts by weight of a chamot of aluminous silicate were mixed with
6 parts of a cold emulsion prepared by kneading 50 parts by weight of pitch in presence of 50 parts by volume of water to which 0.1 part by weight of "Diastersol NDS" had been added.

The work was carried out afterwards as in Example 6

Example 10

95 parts by weight of zirconia chamot

were mixed with

5 parts by weight of an emulsion prepared by adding little by little to 50 parts by weight of coal tar, 1 part by volume of an aqueous solution of 50% (fifty per cent) of "Diastersol NDS", then 49 parts of water.

Work was carried out as in Example 6.

Example 11

90 parts by weight of a chamot of aluminous silicate,

were mixed with

10 parts of an emulsion composed of:
20 parts by weight of fatty clay of Sézane (melting point about 1800° C),
20 parts by weight of tar (or pitch), and
60 parts by weight of an aqueous solution of 5% (five per cent) of "Diastersol NDS".

The mixture was moulded and then baked at 1500° C, as in Example 6.

Example 12

The heavy tar usually employed as agglomerating material for the manufacturing of an oven hearth made out of sintered dolomite or of zircon (zirconium silicate), was replaced by an equal quantity of an aqueous emulsion of pitch containing only 50% (fifty per cent) of pitch prepared as in Example 9.

Work was then carried out as usually.

Example 13

For the manufacturing of cellular refractory bodies:

81 parts by weight of a chamot of sintered magnesia,
4 parts by weight of bibarytic silicate, and
15 parts by volume of water in which 10% (ten per cent) of saponine were added,

were mixed together.

The mixture was beaten up to the formation of a persistant foam, then placed into moulds of the wanted shape, afterwards cautiously dried in the open air, and the products obtained were baked at 1500° C.

GEORGES PASSELECQ.
ALEXIS SÉMÉNOFF.

Published May 11, 1943 Serial No. 382,146

ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF FLEXIBLE ENVELOPES OR THE LIKE

René Leboime, Collonges, and Henri Jacqueau, Paris, France; vested in the Alien Property Custodian

Application filed March 7, 1941

The present invention relates to the manufacture of flexible pieces or walls which must have, simultaneously, qualities of resistance against fire, and some other qualities, such, for instance, as fluidtightness against the passage of gases (and in particular hydrogen), mechanical strength, and so on. The invention is more especially, although not exclusively, concerned, among these articles, with flexible envelopes or reservoirs intended to contain a fluid, and in particular a gaseous fluid under pressure, and, more specifically, balloon envelopes.

The essential object of the present invention is to provide an article of this kind which is better adapted to meet the requirements of practice than those used for the same purpose up to this time.

According to an important feature of the present invention, in order to obtain a flexible article of the type above referred to, we have essentially recourse, on the one hand, to a structure, such as a fabric, of asbestos or any other which is relatively flexible and is incombustible in itself, and, on the other hand, to means (such for instance as another fabric, for instance of a textile material, either combustible or not) intended to give the desired various properties to the whole; the combination thus obtained is such that, if the asbestos structure happens to be bared by a local fire, it constitutes a kind of screen which tends to prevent the propagation of fire, while it maintains, at the place where it has been injured, a certain mechanical resistance, which prevents the tearing of the whole.

Another feature of the present invention relates to hollow bodies having a flexible wall and which are liable to be endangered by fire, such, in particular, as balloon envelopes; It consists in reinforcing the resistance of said flexible wall at the lower part of the body, that is to say in the portion thereof where the propagation of fire is to be most feared, due to the fact that the flames escaping from the injured body have a tendency to curve back upwardly toward the wall thereof.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a diagrammatic cross-sectional view of a composite fabric adapted to be used as a balloon envelope, illustrating what takes place when a hole has been made in said envelope and ignited gas is escaping through said hole from the inside of the balloon;

Fig. 2 is a partial plan view corresponding to Fig. 1.

In the following description, it will be supposed that the invention is applied to the manufacture of a fabric intended to be used for constituting a balloon envelope, and more especially of a balloon intended to be inflated with an inflammable gas.

First, it should be noted that various methods have already been imagined for endeavouring to give a fabric to be used for this purpose in addition to the different properties corresponding to its function (which is to constitute, under a relatively small weight, a gas-tight envelope), as good a resistance to fire as possible.

It seems that this fabric should comply with all of the following conditions, to wit:

a. Resistance to fire, that is to say at least resistance to the quick propagation of fire, after ignition of the gas escaping through a hole made in the envelope;

b. Mechanical resistance, that is to say the fact of maintaining a suitable resistance, after perforation and inflammation of the envelope, in order to avoid the tearing off thereof and the consequent explosion;

c. Fluidtightness against gases, and especially hydrogen;

d. Relatively small weight;

Then, accessorily:

e. Sufficient flexibility, in order to permit all deformations; and

f. A good ageing, that is to say, in particular, a suitable resistance to the action of sun rays and external agents;

As a matter of fact, the essential object of the present invention is to provide a structure which complies with all of these conditions.

It has already been suggested to constitute it by means of fabrics consisting chiefly of matters such as asbestos.

Now, after many experiments, we have found that it is possible to make, for the purpose above indicated, a structure including asbestos which, although it comprises matters which are relatively combustible, makes it possible to resist the action of fire, asbestos having this unexpected effect of delaying the propagation of fire.

This phenomenon, on which the principle of the present invention is based, seems to be explainable in the following manner: Considering an envelope made of a structure, for instance a fabric includ-

ing an asbestos texture, and supposing that the ignited gas is in the form of a jet 1 issuing from a hole *a* (Figs. 1 and 2), ignition of the combustible matters included in said fabric is delayed by the fact that asbestos, bared as the combustion proceeds in a zone such as *b*, acts as a kind of metallic wire net tending to delay the propagation of fire.

Furthermore, this asbestos, during and after combustion, constitutes a resistant support which prevents tearing.

Therefore, the envelope or the like, according to the present invention, includes the following elements:

a. On the one hand, a layer of a matter which is little or not combustible, preferably asbestos as it will be supposed in the following description; however, it should be well understood that any other incombustible matter, either mineral or not (such, for instance, as slag wool, glass silk, metallic wire net, and so on) might be used, either alone or in combination with asbestos; and

b. On the other hand, means combined with this layer and adapted to give the whole the various conditions required from such an article; the choice and adaptation of these last mentioned means becoming relatively easy, in view of the fact that their eventual combustion is in no way a serious obstacle.

This principle may be applied in many different manners, and in particular as follows:

Concerning first the part of the structure which is made of asbestos or another equivalent material such as above mentioned, it is preferably made in the form of at least one sheet of a fabric A (Figs. 1 and 2), which is to be both light and strong, therefore relatively close-woven, the spaces between the warp and weft threads being as reduced as possible.

For instance the threads will be of a thickness corresponding to 10.000 to 20.000 meters per kilogram, their number ranging from 8 to 20 per centimeter, but it should be well understood that these values are given merely by way of indication and have no limitative character. According to an embodiment of our invention, the thickness of the fabric ranges from $\frac{3}{10}$ to $\frac{8}{10}$ of a millimeter.

Concerning now the above mentioned means (intended to give the whole the various properties that the asbestos fabric cannot have when taken alone) they are made as follows:

a. either merely by means of one or several coatings capable, in particular, of making the layer or layers of asbestos or asbestos fabric gas-tight;

b. or, preferably, by means of at least one other fabric B, forming at least one layer, and preferably combined with one or several coatings.

Considering the case of the second mentioned means, and concerning first the choice of this fabric B, we may make use of a fabric of a vegetal animal, or other type, for instance made of cotton, wool, silk, artificial silk and so on. But it should be well understood that we do not exclude fabrics made of incombustible materials (such as asbestos, glass silk, a metal net, and so on) and that this second fabric B might even be identical with the first fabric A.

The second fabric will be preferably woven very close, and with tightly juxtaposed threads, so as to ensure as good a fluidtightness as it is possible.

Concerning the choice of the coating or coatings, it may be advantageous to make use of mixtures containing plastic materials, such as those known in the rubber industry and, in particular, in the manufacture of rubberized fabrics.

However, it seems preferable to make use of coatings consisting chiefly of synthetic rubber, which has very valuable properties of ageing (non-alteration by sun rays).

Preferably, we make use of a synthetic rubber consisting chiefly of "neoprene."

Now, having, for instance, at least two layers of fabric, which may be constituted, as above stated, either by the same material, or rather, as it will be hereinafter supposed, by two different materials A and B, we proceed, for instance, for the incorporation of the coating or coatings, in one of the following manners:

First, such a coating is advantageously used for causing the two fabrics A and B to adhere to each other at 2 (Fig. 1), this result being obtained in any manner known in the manufacture of rubberized fabrics.

Furthermore, the composite fabric thus obtained is provided, either on one of its external faces or on both of these faces, as shown at **3** and **4** in Fig. 1, with one or several layers of this coating this operation being effected in any suitable manner, for instance by impregnation on the loom or by calendering.

These layers may be all of the same thickness or on the contrary of different respective thicknesses, the whole being such that the total thickness of the fabric obtained remains sufficiently small for maintaining the desired qualities of flexibility and light weight, such a thickness ranging preferably from $\frac{3}{10}$ to $\frac{8}{10}$ or even $\frac{10}{10}$ of millimeter.

These layers serve chiefly to ensure fluid-tightness and good ageing qualities (resistance to the action of sun rays and of external agents) owing to the very nature of these coatings.

Furthermore, they have a relatively considerable resistance to the action of fire, it being well understood however than, in any case, asbestos is brought into play for delaying the action of fire on the adjoining surfaces, in the conditions above stated, and also for ensuring a good mechanical resistance.

Eventually, the whole might be completed, on the outer side, by a fluidtight varnish impervious to gases and resisting the action of atmospheric agents. This varnish might be superposed to one of the layers **3** and **4**, and it might even wholly replace it.

Finally, it should be noted that, to at least some of the various constitutive elements above specified (fabrics, coatings, varnishes) we may eventually adjoin fire-proofing products. By way of example, these products might consist at least partly of ammoniaco-magnesium phosphates, of boron-phosphates of ammonium, and so on.

Whatever be the particular embodiment that is chosen, we obtain fabrics which are well adapted to be used for the purposes above mentioned and comply with many combined conditions, the chief of which are the following:

Resistance to fire, owing to the special action of asbestos, which delays the propagation of fire;

Mechanical resistance, asbestos also having, from this point of view, the property of opposing tearing off after a local fire; gas-tightness; light weight; flexibility; and resistance to the action of atmospheric agents.

Of course, the application of our invention to

the manufacture of envelopes for balloons has no limitative character.

For instance, the invention might be also applied, among other uses:

a. To the construction of flexible tanks or reservoirs adapted to contain liquids or gases, either inflammable or not;

b. To the manufacture of fabrics for home decoration (curtains, wall coverings and so on), for clothes of all kinds, etc.

c. To the construction or external covering of pipes, either flexible or not, for liquids or gases, etc.

When the invention is applied to the construction of balloons, another feature of our invention consists in reinforcing the qualities of resistance to the action of fire of the envelope in the lower portion of said balloons.

In this portion of the balloon, the jet of ignited gas issuing from a hole made in the envelope, as illustrated at *l* in Fig. 1, is, at its base directed downwardly. But as the gas is lighter than air, this jet tends to curve upwardly and to come into contact with surrounding portions of the envelope, which increases the damage caused by the flames.

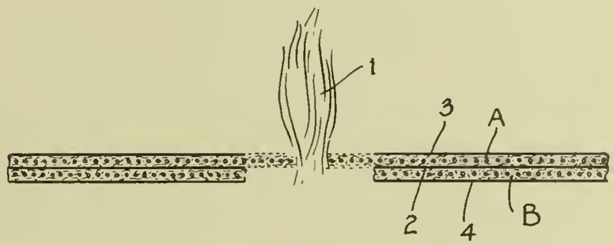
In order to improve the resistance of this lower portion of the balloon, we may proceed in any suitable manner, acting for instance on at least one of the following characteristics, to wit: number of layers of fabric, thickness of these layers, thickness of the coatings, addition of fire-proofing products, etc.

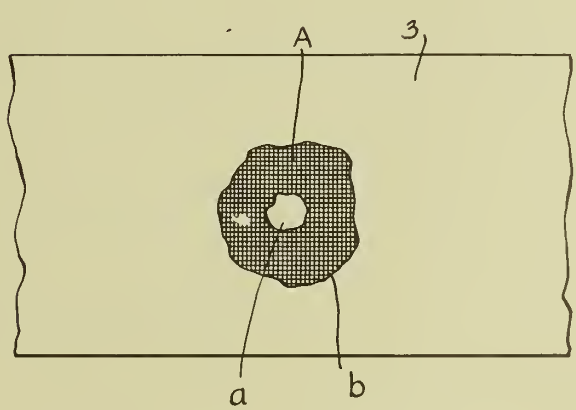
RENÉ LEBOIME.
HENRI JACQUEAU.

PUBLISHED R. LEBOIME ET AL Serial No.

MAY 11, 1943. MANUFACTURE OF FLEXIBLE ENVELOPES OR THE LIKE 382,146

BY A. P. C. Filed March 7, 1941





INVENTORS
RENÉ LEBOIME
HENRI JACQUEAU
BY
THEIR ATTORNEY

Published May 11, 1943 Serial No. 382,653

ALIEN PROPERTY CUSTODIAN

LOCKING DEVICE FOR BOLTS, SPINDLES OR THE LIKE

Katsuichi Ozuka, Itabashi-ku, Tokyo, Japan; vested in the Alien Property Custodian

Application filed March 10, 1941

This invention relates to a device for locking a bolt, spindle or the like against loosening and detachment, consisting of a bolt having a screw threaded portion at one end and a head at the other, said bolt head being formed with a diametral slot having both ends inclined, or the top edge of said bolt head being bevelled so as to form a conical face, a block having a cavity for receiving said bolt head and formed with a recess or recesses in the side wall thereof, and a locking staple adapted to be inserted and pressed into said diametral slot in the bolt head, or a locking cap having a plurality of tongues, whereby the legs of said locking staple or the tongues on the locking cap are adapted to be bent outwardly and engaged by said recesses in the side wall of the cavity when said locking staple or cap is mounted and pressed upon the bolt head. The object of the invention is to provide a locking device of simple construction which is adapted for effectively preventing loosening and detachment of the bolt, spindle or the like due to vibration, by extremely simple means.

In the accompanying drawings, in which a plurality of embodiments of the invention are shown by way of example,

Figs. 1, 3 and 5 show in longitudinal section three different forms of devices for locking screw bolts;

Figs. 2, 4 and 6 are longitudinal sections taken at right angle to Figs. 1, 3 and 5 respectively;

Figs. 7 and 9 show in longitudinal section two different forms of devices for locking spindles or connecting pins;

Figs. 8 and 10 are longitudinal sections taken at right angle to Figs. 7 and 9 respectively;

Fig. 11 is a plan view of Fig. 8, partly in section;

Fig. 12 is a plan view of Fig. 10, partly in section;

Fig. 13 is a section of the block shown in Fig. 5, with the bolt and the locking cap not mounted;

Fig. 14 is a plan view thereof, partly in section;

Figs. 15, 16 and 17 show in perspective views three different forms of the bolts and locking staple and caps; and

Fig. 18 shows in section a position of a locking cap just being pressed on the bolt head.

Referring to the drawings, particularly Figs. 1 to 6, 1 designates a screw bolt screwed into an internally threaded bore 2 in a block A, which may be for example a boss or collar which is to be fixed by the screw bolt 1 to a rod or shaft *a*. Said bolt 1 has a head 3 adapted to be received in a cavity 4 formed in the block A. At the top, the head 3 is formed with a diametral slot 5 for receiving a driver, by which the bolt 1 is screwed into the block. Said diametral slot 5 is bevelled off at both ends, forming inclined faces 6, as shown in Figures 1 and 15. Alternatively, the top edge of the head 3 is bevelled so as to form a conical face 6′ as shown in Figs. 3 to 6 and Figs. 16 and 17. The cavity 4 is formed with an annular recess 7, or is formed with diametrically opposite recesses 7′. 8 is a locking staple adapted to be inserted and driven into the slot 5, whereby the legs 9 are bent outwardly by being acted upon and guided by the inclined faces 6 and inserted into the annular recess 7. In the form shown in Figs. 3, 4 and 16, a locking cap 8′ having two or more tongues 9′ is used. This cap serves similarly as the locking staple 8, and when it is inserted and driven into the cavity onto the head 3 of the bolt, the tongues 9′ are bent outwardly by being acted and guided by the conical inclined face 6′, and are thus engaged by the annular recess 7 or recesses 7′.

Figs. 7 to 10 are embodiments of this invention as applied to a spindle or pin serving, for example, as a pivot for a hinge, a handle, or other turning element *b* forming a machine part. Referring to the drawings, 1 designates a spindle having screw thread at one end and a head 3 at the other end. Similar parts are designated with similar reference numerals as in the above mentioned forms, and further explanation in detail will not be necessary. In the form shown in Figs. 7 and 8, a locking staple 8 is used, whilst in the form shown in Figs. 9 and 10, a locking cap 8′ is used.

In the use of this invention, the screw threaded portion of the bolt or spindle 1 is screwed into the internally threaded bore 2 in the block A or B by means of a suitable driver inserted into the diametral slot 5 in the head 3, so that said head 3 is embedded in the cavity 4. Then, the locking staple 8 or locking cap 8′ having the tongues 9′ is mounted and pressed upon the head 3. The legs 9 of the locking staple 8, or the tongues 9′ of the locking cap 8′, are pressed against and guided by the inclined faces 6 of the slot 5 or the conical face 6′ respectively, and are bent outwardly to be received by the annular recess 7 or by the recesses 7′, whereby locking the bolt or spindle 1 against any movement.

From the foregoing, it will be seen that, according to this invention, as the head of the bolt is embedded in the cavity in the block, and the detachment of the bolt is prevented by the lock-

ing staple or the locking cap having the tongues, the head of the bolt and the locking device are not projected from the block A, but flush with the top of the latter, so that there will not be any hindrance. As the legs of the locking staple, or the tongues of the locking cap, are automatically bent outwardly and engaged by the recesses **7** or **7'** when the locking staple **8** is mounted and pressed in the slot **5** in the bolt head or the locking cap **8'** is mounted and pressed upon the bolt head in the cavity **4**, loosening or detachment of the bolt **1** is effectively prevented by simple operation, yet the locking device cannot be so readily removed. Moreover, as the presence of the locking device is practically invisible, comparatively good appearance of the device equipped with the present invention may be obtained.

KATSUICHI OZUKA.

PUBLISHED K. OZUKA **Serial No.**

MAY 11, 1943. LOCKING DEVICE FOR BOLTS, SPINDLES OR THE LIKE **382,653**

BY A. P. C. Filed March 10, 1941 2 Sheets-Sheet 1

Fig 1

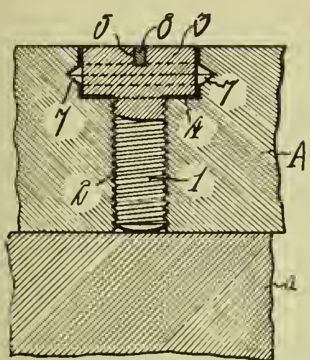


Fig 2

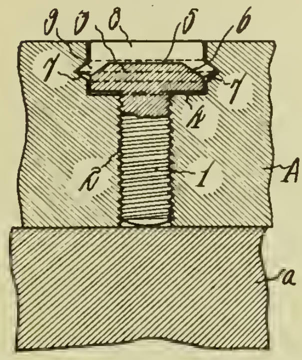


Fig 15

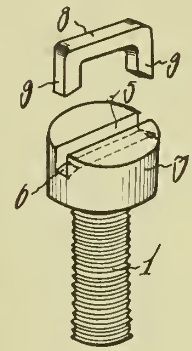


Fig 3

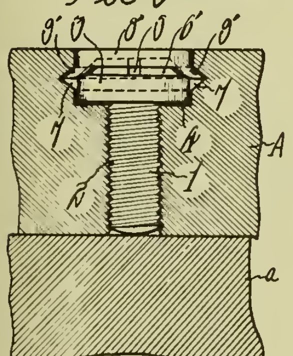


Fig 4

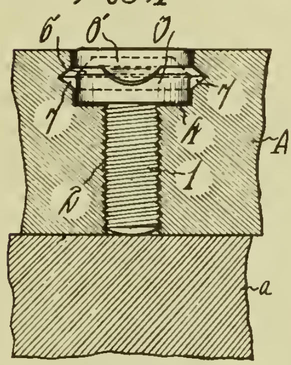


Fig 16

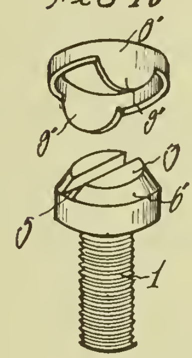


Fig 5

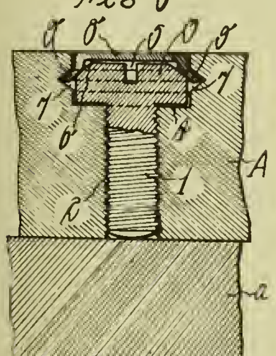


Fig 6

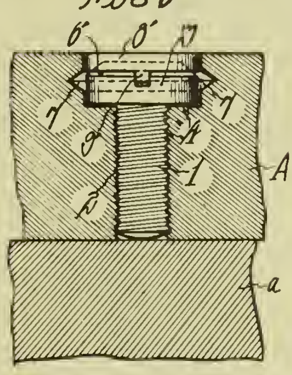
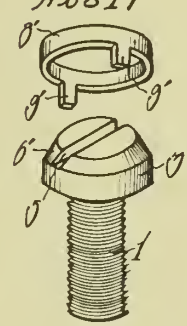


Fig 17



Inventor

Katsuichi Ozuka

By Singer, Ehlert, Stern & Carlberg

Attorneys

PUBLISHED MAY 11, 1943. BY A. P. C.

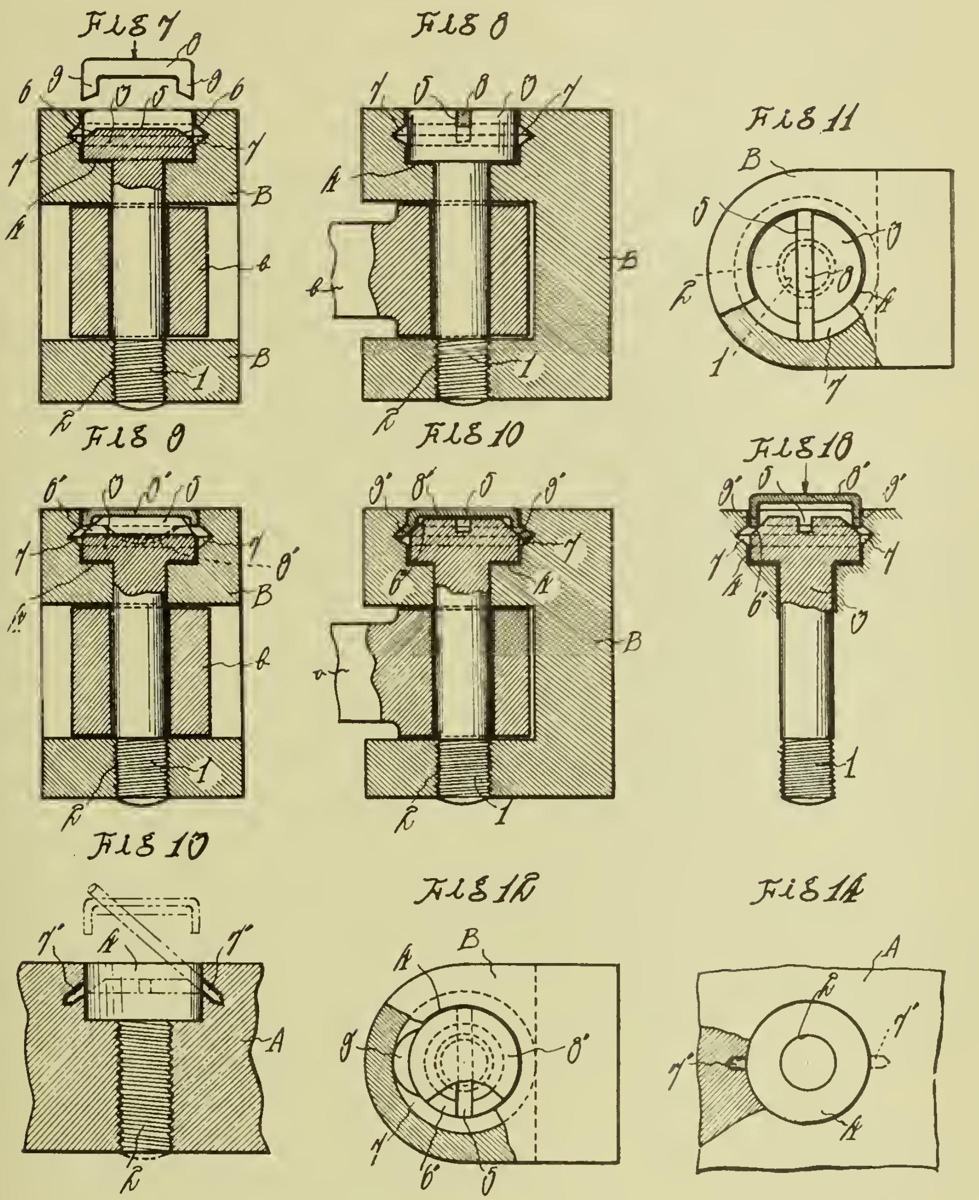
K. OZUKA

LOCKING DEVICE FOR BOLTS, SPINDLES OR THE LIKE

Filed March 10, 1941

Serial No. 382,653

2 Sheets-Sheet 2



Inventor

Katsumi Ozuka

By Singer, Ehlert, Stern & Carlberg

Attorneys

Published May 11, 1943 Serial No. 382,660

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF SHAPED PRODUCTS AND COATINGS, WHICH ARE RESISTANT TO THE INFLUENCE OF MOTOR FUELS, OILS AND SOLVENTS

Fritz Heinrich, Selters, Fritz Duell, Montabaur, and Fritz Tempel, Berlin-Köpenik, Germany; vested in the Alien Property Custodian

No Drawing. Application filed March 10, 1941

The present invention concerns a process for the production of shaped products and coatings, which are resistant to the influence of motor fuels, oils and solvents.

It is known that the condensation products of organic dihalogen compounds, as for example ethylene dichloride, $\beta\beta'$-dichlor-diethylether etc., with alkali polysulfides, which are known as "thioplastes", excel in being motor fuel-proof, oil-proof and solvents-proof. In spite of these excellent qualities of the products both in physical and chemical respect, they were, however, too unreliable for practical use: During the employment of these products for technical purposes various difficulties turned up, which could not be overcome. For example these materials have a disagreeable, penetrating odor, which even by the addition of other smelling substances could not be eliminated. Thus the practical use was restricted to technical purposes. Another disadvantage consists in that parts of the thioplastes, probably owing to their lower degree of polymerization, were solved by influence of the solvents. Although the solving of these parts of the thioplastes takes place in small quantities, it suffices for rendering the reacting solution impure, by which fact in many cases the use of thioplastes is rendered impossible. By influence of fuels, for example, which must be practically free from sulfur compounds and resinous components, on thioplastes, an amount of such undesired admixtures is solved, which will increase the impurity of the fuels to an inadmissible extent.

One has tried to wash off or extract the soluble components of the thioplastes. These measures, however, failed to succeed, both in technical and in economical respect.

According to the present invention it has been found that the disadvantages described as above can be removed in the following simple manner: The protective coating of thioplaste is covered with a layer out of a solution or emulsion from polyacrylic acid or their derivatives, shellac, chlorinated caoutchouc or synthetic resins on the basis of phenol aldehyde, vinyl chloride or the like. The kind of coating on the thioplaste depends on the strain, to which the shaped products and coatings will be exposed.

The fact that a single layer, described as above, suffices to prevent diffusion of gaseous and soluble components of the thioplastes, is surprising. Hereby it is indicated that the components, which are lost or solved, have a very low diffusibility, which probably means a considerable molecular magnitude.

Of course the same effect is produced by putting on several succeeding layers.

FRITZ HEINRICH.
FRITZ DUELL.
FRITZ TEMPEL.

Published May 11, 1943 Serial No. 383,215

ALIEN PROPERTY CUSTODIAN

SHIP FORM

Ernst Klindwort, Hamburg-Blankensee, Germany; vested in the Alien Property Custodian

Application filed March 13, 1941

This invention relates to certain improvements regarding ship forms, of the type having a bulbous bow similar to the so-called "Taylor bulbous bow."

Many types of hulls used in practice have a bulbous portion at the keel of the vessel or in the lower portion of the immersed part of the bow, while according to another proposition a bulb is provided in the region of the constructional water line (C. W. L.). However, the last-mentioned proposition, although suggesting certain improvements regarding the wave-producing resistance, i. e. an increased speed with a given output, does not meet sufficiently with the requirements of practice. More particularly, variations of the draught of the ship and changes of trim, caused by changes of the quantity and weight of the cargo and the consumption during the journey, as well as influences of the waves must be taken into account. Therefore, the actual water line in many instances may be at a lower level than the constructional water line, so that a bulb in the region of the constructional water line will frequently emerge from the water and thus fail to meet its actual purpose. Moreover, it has been found that a bulbous portion in the region of the constructional water line may give rise to heavy spray water phenomenons.

It is an important object of the present invention to provide a shape of the fore-ship which avoids the drawbacks of the said bulbous portions in the constructional water line while being more efficient than the so-called "Taylor-bulb," which has been described, for instance, in an article in "Marine Engineering and Shipping Age" September 1923, on pages 540 to 548.

With this and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawings, but includes further structures coming withing the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its structural forms, as illustrated by the accompanying drawings in which:

Fig. 1 is a diagrammatic side view of the bow of a vessel having the invention applied thereto.

Fig. 2 is a diagrammatic section on line II—II of Fig. 1.

Fig. 3 is a view similar to Fig. 1, showing a modification.

Fig. 4 is a diagrammatic section on line IV—IV of Fig. 3.

Fig. 5 is a diagrammatic side view showing a further modification, including two superposed bulbous portions.

Fig. 6 is a diagrammatic section on line VI—VI of Fig. 5.

Figs. 7 to 15 are diagrammatic sections similar to Fig. 6, but showing various modifications.

Figs. 16 to 25 are diagrammatic side views showing further modifications.

Figs. 26 to 29 are diagrammatic horizontal sections of various forms of ship bows having the invention applied thereto.

Figs. 30 and 31 are diagrammatic side views showing the stern of a vessel embodying an additional feature of the invention.

Fig. 32 is a diagrammatic side view of a ship's bow embodying a combination of my novel bulbous bow shape with a rearwardly cut off stem.

Fig. 33 is a fragmentary section showing the subsequent mounting of my bulbs.

Similar characters of reference denote similar parts in the different figures. For the sake of clarity, the sectional views have been indicated by their outer contours only, without hatching or detailed showings.

Referring now to the drawings in greater detail, and first to Figs. 1 and 2, the fore-ship **1** is provided with a bulb **2** disposed below the constructional water line or the load line of the vessel, spaced therefrom by a distance d_1 sufficient to avoid the above mentioned deleterious effects of bulbs in the region of the water line f, but spaced also from the keel k by a distance d_2 sufficient to produce a more intensive effect of the bulb upon the formation of the bow wave indicated at **3** than a so-called Taylor bulb arranged at the keel level. Practically speaking, I arrange the bulb to have its maximum width w at a level above the line d indicating half the total draught of the vessel, whereby the height of the bow wave is substantially reduced even in a speed range where the conventional Taylor bulbous bow would not be effective yet. It will be understood that the line d is at a level which is spaced by the distance

$$\frac{d_1+d_2}{2}$$

from the keel **4** as well as from the water level f, as indicated.

The bulb **2** should be arranged at such a distance d_1 below the line f, indicating the constructional water line, or below the load line, respectively, that the favourable effects of the Taylor keel bulb preventing the formation of spray water with medium height of the waves and with

changed trim, as produced by the various customary load conditions, is preserved as much as possible. By the arrangement of my pear-shaped bulb 2 at the level above stated, the bulb under practically any conditions will remain immersed, thus being enabled to produce interference with the normal bow wave system, i. e. to neutralize the normal bow wave, or at least to reduce the same, whereby the output required for propelling the ship is reduced.

Extensive tests have shown that my novel bulbous portion may be constructed in various manners. In the embodiment shown in Figs. 1 and 2 the bulb is shaped similar to a solid generated by rotation about the axis *b*, said solid passing over into the normal bow shape through relatively sharply bent curves.

The shape of fore-ship shown in Figs. 3 and 4 differs from Figs. 1 and 2 merely by the fact that the bulb 2 is arranged at a lower level d_1 from the water line *f*, the maximum width, however, still being in the upper half of the immersed or wetted ship portion, i. e., above the line *d* indicating half the amount of draught.

Towing experiments have shown that my novel bulbous portions produce favourable effects even at relatively low speeds, while the conventional Taylor bulbous bow in the form of a pear-shaped bulb at the keel produces favourable effects at a higher speed only. Therefore, as indicated in Figs. 5 and 6, I contemplate combining my novel bulbous projection 2, having its maximum width at a point in the upper half of the total draught, with a second bulbous portion 4 of the Taylor type, arranged at keel level, or in the lower half of the immersed portion of the fore-ship, respectively.

Figs. 7 to 15 illustrate various modifications of the combination shown in Figs. 5 and 6.

It has been found that a favourable effect can be attained, for instance, by making the maximum width of the bulb to fade out towards the keel, in the form of a straight or slightly concave or convex curve, as shown in Figs. 7, 8 and 9, respectively. This shape may be advantageous for constructional reasons or in case that it is intended to put the center of gravity of the displacement afore.

The same effect is still more pronounced in a modification in which the maximum width of the bulb is maintained over a larger region of the immersed portion of the fore-ship, in a cross-sectional form similar to a bottle, as shown in Fig. 10, or in which the maximum width of the bulb is even enlarged in width towards the keel, as shown in Fig. 11. The shape shown in Fig. 11 is distinguished from any of the known hulls having a bulbous bow, by the shape of the frames in the upper half of the immersed portion of the fore-ship.

It has been found, moreover, by numerous tests that where two bulbous portions are provided the width of the two bulbous portions influences their effect. With a view to practical requirements, for instance, in anchoring manoevres, it may be desirable to keep the width of the bulbous bow portion within certain limits. In this case it will be suitable to equalize the width of the two bulbous portions, as shown in Fig. 12.

However, in order to reduce the wave formation as much as possible, it may be advantageous to make one bulbous portion thicker than the other one. Therefore, according to a further important feature of the invention, two bulbous portions of different maximum width are provided. In this case, it will depend on the special circumstances whether the upper bulbous portion is made wider, as shown in Fig. 13, or the lower one, as shown in Fig. 14.

According to a further feature of the invention, the connection between the upper and lower main bulb may be formed by a wave line comprising one or more waves. For instance, Fig. 15, right hand half, illustrates a modification in which the connection between the upper and lower bulb 6 and 7 is formed by one wave 8, while the left hand half of Fig. 15 shows a bow shape with two waves 9, 10, between the main bulbs 6 and 7. These forms will be used especially where it is possible, by carrying out extensive towing experiments, to find out the most favourable pressure conditions for the respective case and thus to secure the optimum reduction of the bow wave which is attainable in the respective case by means of bulbous portions disposed below the constructional water line. Also, it may be desirable to provide several bulbous portions for stabilizing pitching phenomenons.

Generally, care should be taken that the horizontal width "*a*" of the bulbous portions at the keel is not made larger than required for receiving the pressure forces occurring in docking operations. Moreover, the bilge angle α should be chosen so that the formation of spray is avoided as much as possible as the fore-ship is re-immersed after complete emergence in rough sea.

The effect of the bulbous bow is greatly determined by the shape of the upper region of the upper bulbous portion. In all modifications, a characteristic bulb similar to a Taylor bulb is provided above the line *d* of half the total draught, as indicated in Figs. 7 to 15.

Owing to the wide variety of ship hulls to which the invention can be applied, no general figures can be given regarding the dimensions and especially regarding the length of the bulbous portions. In some instances, it may also be useful to provide several bulbous portions of different length, as shown by way of example in Figs. 16 and 17. According to Fig. 16 the lower bulbous portion 11 is made longer than the upper bulb 12 while according to Fig. 17 the upper bulbous portion 13 is made longer than the lower bulb 14.

Experiments have shown that the pressure effect of the bulbous portions also depends on their construction and arrangement in longitudinal direction of the ship. Depending on the desired efficiency of the bulbs it may be advantageous to arrange the bulbous portions with their center line *b* in horizontal position, as indicated, for instance, in Figs. 1 and 5, or in an inclined position, for instance, rising abaft, as shown in Fig. 18, or sloping abaft, as indicated in Fig. 19. Moreover, where a plurality of bulbs are provided, they may have different slope, as indicated in Figs. 20 and 21, showing an upper bulb with downward slope abaft combined with a lower bulb in horizontal or rearwardly rising position, respectively.

Furthermore, I contemplate arranging the bulbous portions in longitudinally staggered positions. Here again, it depends on the special circumstances of the case whether it is desirable to arrange the upper bulbous portion staggered abaft with respect to the lower one or vice versa. Typical shapes of this type are shown in Figs. 20 to 24, viz:

Fig. 20 shows the upper bulb staggered abaft relatively to the lower one, the stem being made to conform to this staggered arrangement. Fig.

21 shows a similar arrangement, but with a stem of normal, smooth shape. Fig. 22 illustrates an embodiment with the upper bulb arranged afore the lower one, the stem again being made to conform to this arrangement, and Figs. 23 and 24 show similar types, but with modified stem shapes. The shape of Fig. 24 offers the advantage that the wetted surface is small.

Referring now to Fig. 25, it will be noted, that the bulbous portions in this case are made to project forwardly from the stem, whereby a maximum effect of the bulbous bow can be secured in many cases.

Generally, a horizontal section through a Taylor bulbous bow shows a contour which after reaching the normal bulb width underlying the construction runs parallel to the center plane of the ship, as shown in Fig. 26, or passes over into the normal ship hull with a gradually increasing width. My experiments have shown, however, that special advantages can be secured by recontracting or tapering the bulb abaft behind a maximum width, as shown in Fig. 27. In both cases, the dotted line **15** indicates the normal contour of the hull above and below the bulb or bulbs.

It will be understood that the horizontal section shown in Fig. 27 refers to a horizontal bulbous portion. Where the bulb is rising or sloping abaft, as per Figs. 18 to 21, the contours of Fig. 27 would relate to a section on a plane *b* disposed at right angles to the middle plane of the ship and forming the plane of symmetry or the plane of maximum width of the bulb.

The circular shape of the front end of the bulb in Figs. 26 and 27 may be used where emergence of the bulb from the water is not to be expected. With sea-going ships, on the other hand, where emergence of larger portions of the fore-ship will be occasioned it is advantageous to provide a sharp edge with a front angle β of less than 180°, as shown in Fig. 28, or a shape as shown in Fig. 29.

In some instances, for example, where the hull of the ship is sufficiently slim as to permit at the aft-ship reconversion of a considerable portion of the potential energy of flow absorbed by the fore-ship, similar bulbous portions arranged corresponding to those at the bow may be provided at the aft-ship, as shown in Figs. 30 and 31, for reducing the formation of stern waves. Fig. 30 shows two horizontal bulbous portion of about equal length arranged at the stern of a single screw ship, while Fig. 31 shows a similar arrangemen at the stem of a multi-screw ship having an even number of screws.

Fig. 32 illustrates the combination of a bulbous bow portion **2** in the upper half of the total draught combined with a stem which below the bulb is cut off abaft for reducing the size of the frictional area or wetted surface.

I contemplate also combining any of the above described features of my invention with each other in a suitable manner. For example, a plurality of bulbous portions of equal or different maximum width may be arranged at different slope of their center lines, in a staggered relationship. The arrangement adapted to reduce the formation of waves most efficiently must be determined in each case by tests carried out with the ship in question, or with a model thereof, in a model basin, or, at a later date, may be determined by theoretical considerations and computations, basing on the data of the respective ship.

Further, my novel bulbous portions, besides being provided on newly constructed ships may also be fitted subsequently on existing ships. To this end, vaulted sheet iron plates may be welded or riveted to the hull of the ship, as indicated in Fig. 33. Thus, the resistance of the ship can be reduced and as a result the speed can be increased or the output of the engine and the fuel consumption reduced.

The principle of this invention may be applied both to sea-going and inland ships. In the latter case, it is an advantage that pitching motions generally need not be taken into account.

It should be noted that the term "bulb" or "bulbous portion" as used in this specification and in the claims relates to curved projections of the type extending lengthwise on the hull of the ship, preferably in a streamline shape, as illustrated.

The method of the present invention has been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

ERNST KLINDWORT.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 1

Fig. 1

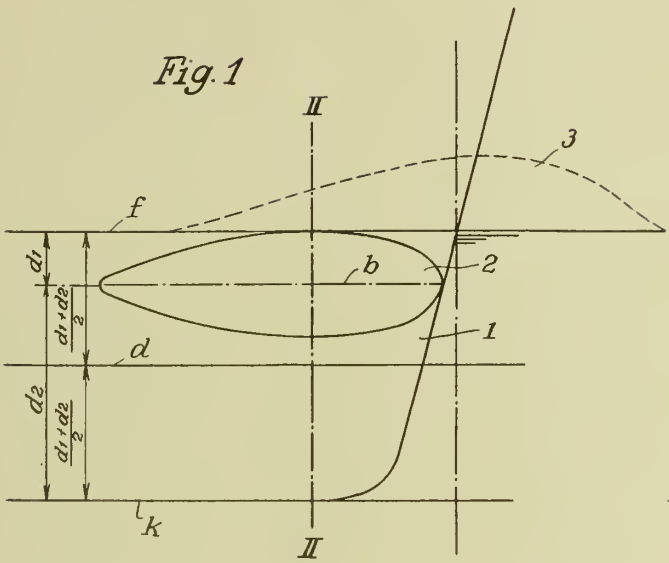


Fig. 2

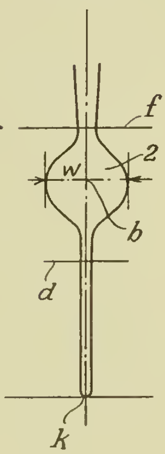


Fig. 3

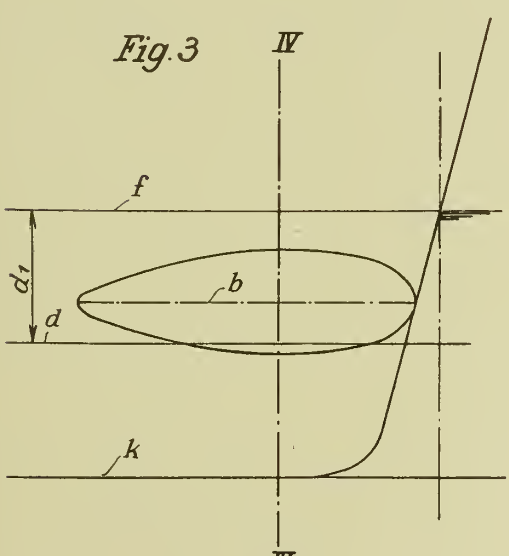
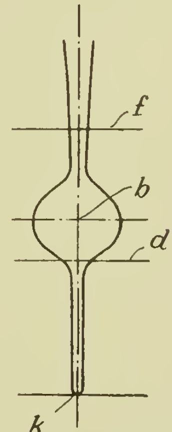


Fig. 4



Inventor
E. Klindwort

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 2

Fig. 5

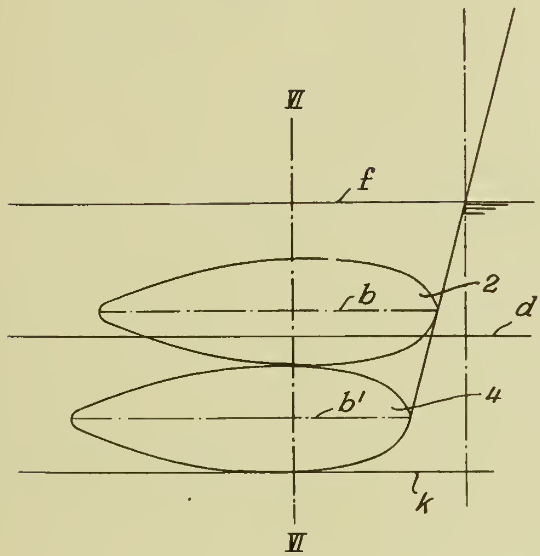


Fig. 6

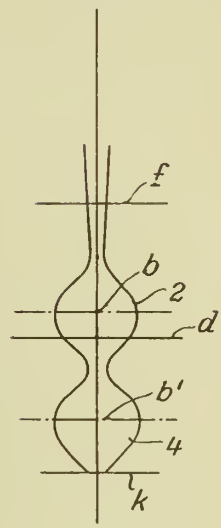


Fig. 7

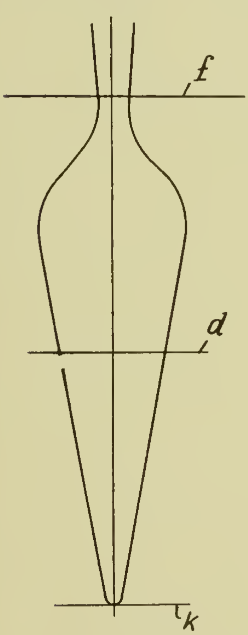


Fig. 8

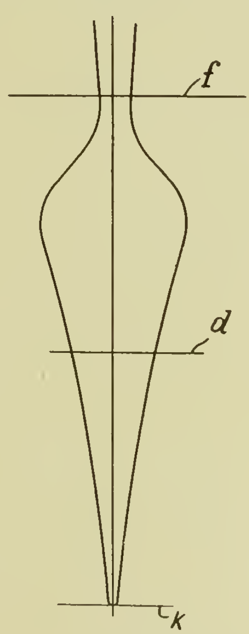
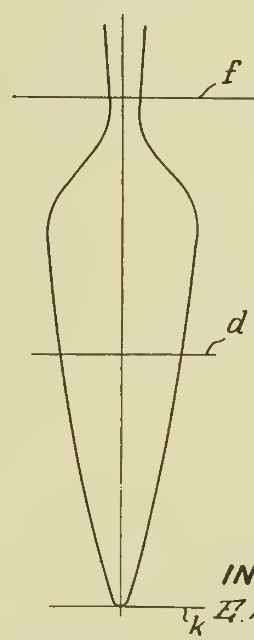


Fig. 9



INVENTOR
E. Klindwort

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. KLINDWORT

SHIP FORM

Filed March 13, 1941

Serial No. 383,215

10 Sheets-Sheet 3

Fig.10

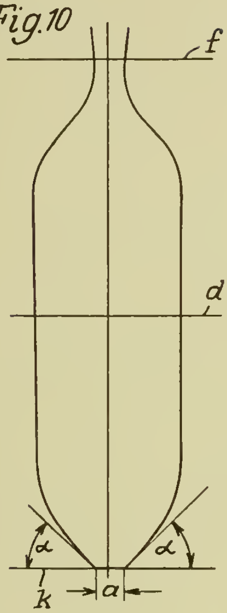


Fig.11

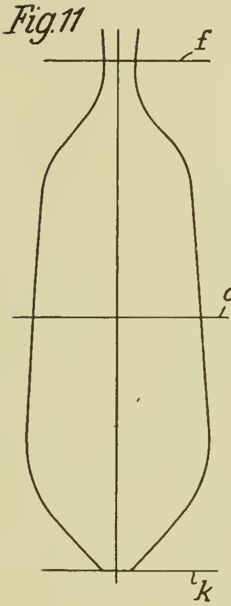


Fig.12

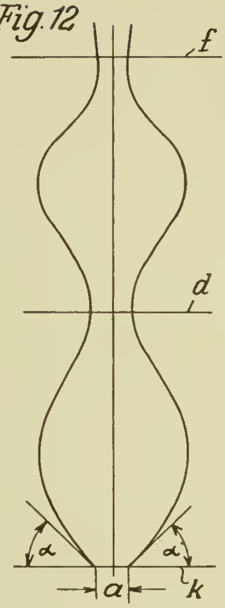


Fig.13

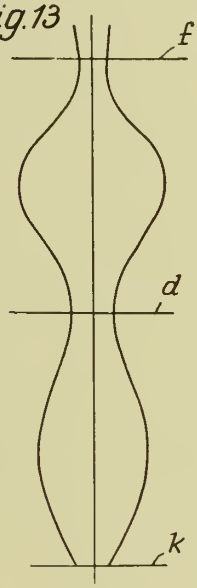


Fig.14

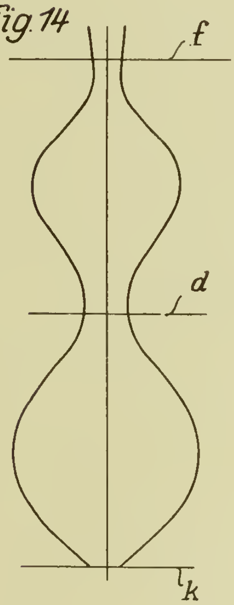
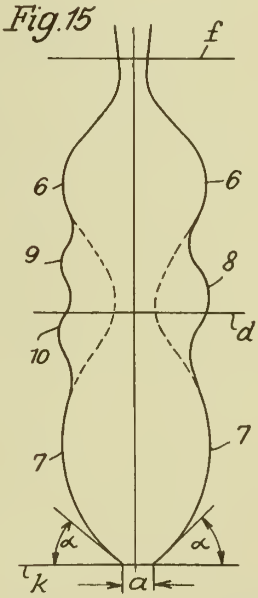


Fig.15



INVENTOR

E. Klindwort

By: Glascock Downing & Seebold

Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. KLINDWORT

SHIP FORM

Filed March 13, 1941

Serial No.

383,215

10 Sheets-Sheet 4

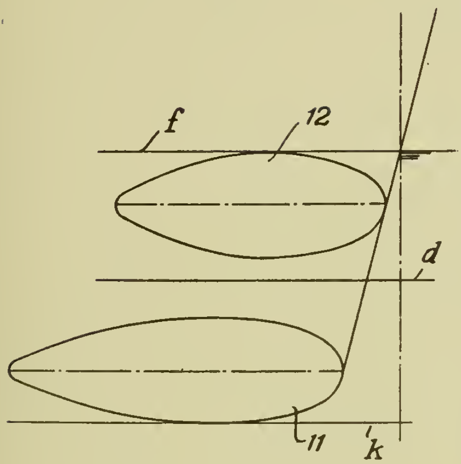


Fig. 16

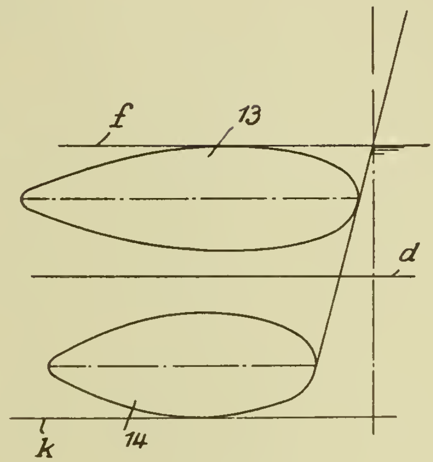


Fig. 17

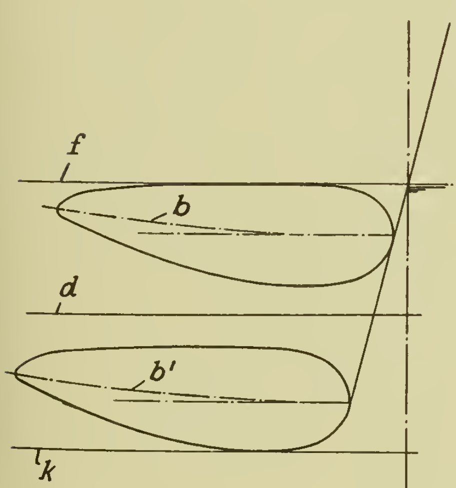


Fig. 18

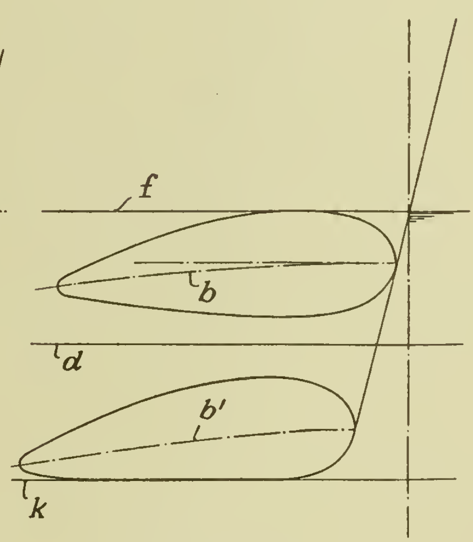


Fig. 19

INVENTOR

E. Klindwort

By: Glascock Downing & Seebold

Attys

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 5

Fig. 19a

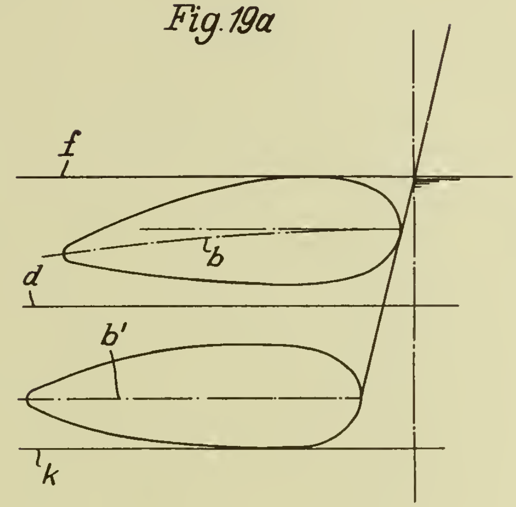
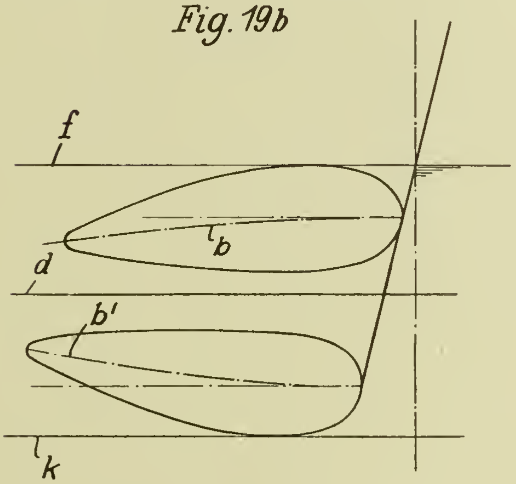


Fig. 19b



INVENTOR
E. Klindwort

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 6

Fig. 20

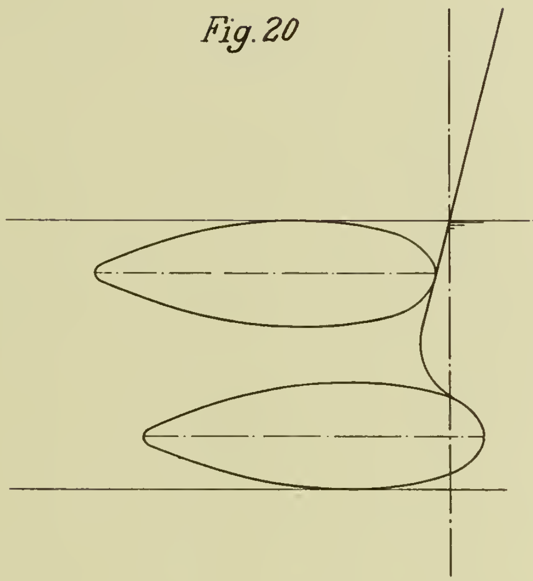
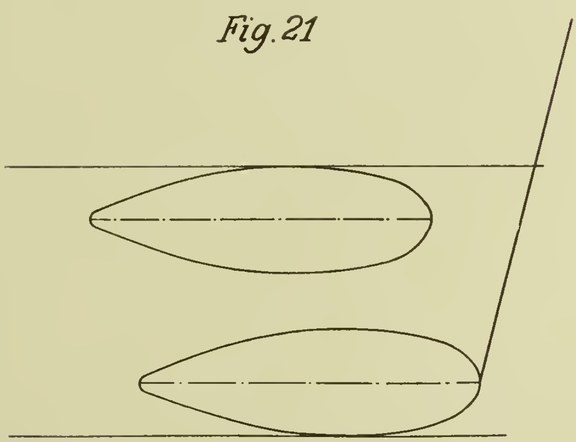


Fig. 21



INVENTOR
E. Klindwort

By: Glascock, Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 7

Fig. 23

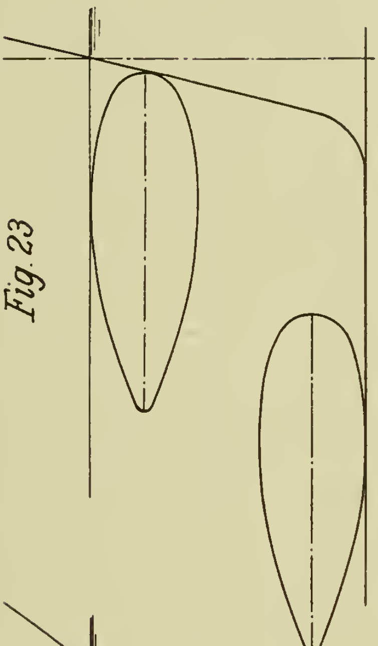


Fig. 24

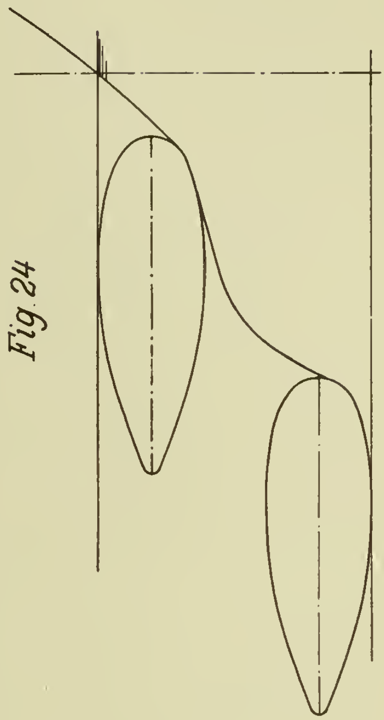
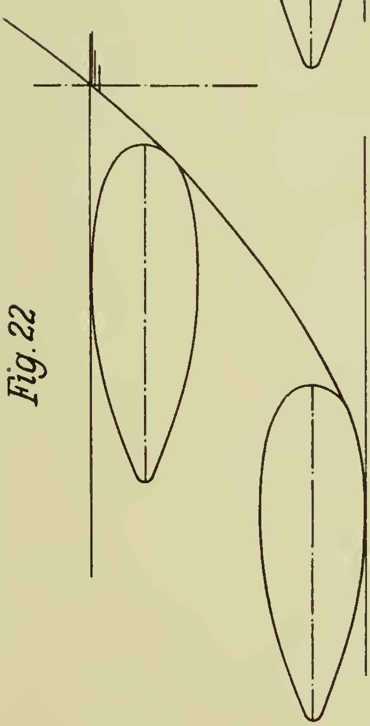


Fig. 22



INVENTOR
E. Klindwort

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 8

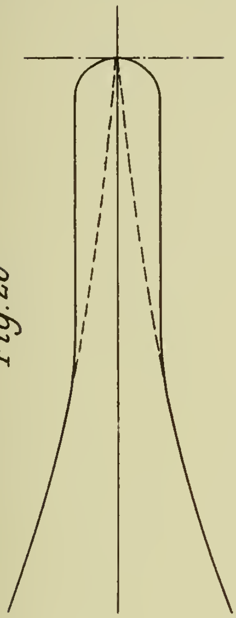


Fig. 26

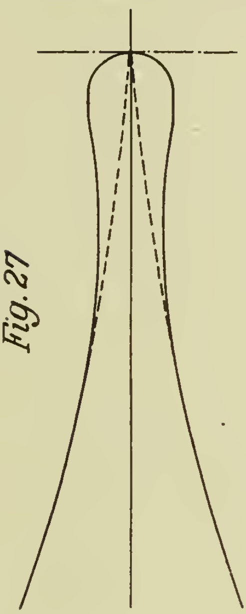


Fig. 27

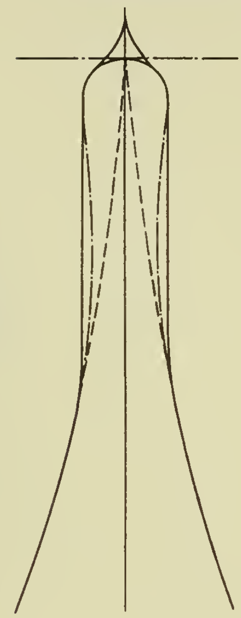


Fig. 29

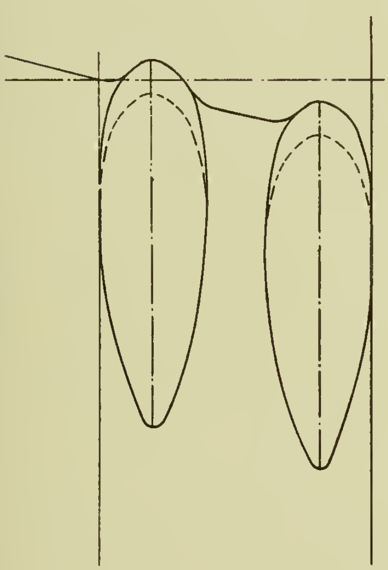


Fig. 25

Fig. 28

INVENTOR
E. Klindwort

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. KLINDWORT
SHIP FORM
Filed March 13, 1941

Serial No.
383,215
10 Sheets-Sheet 9

Fig. 31

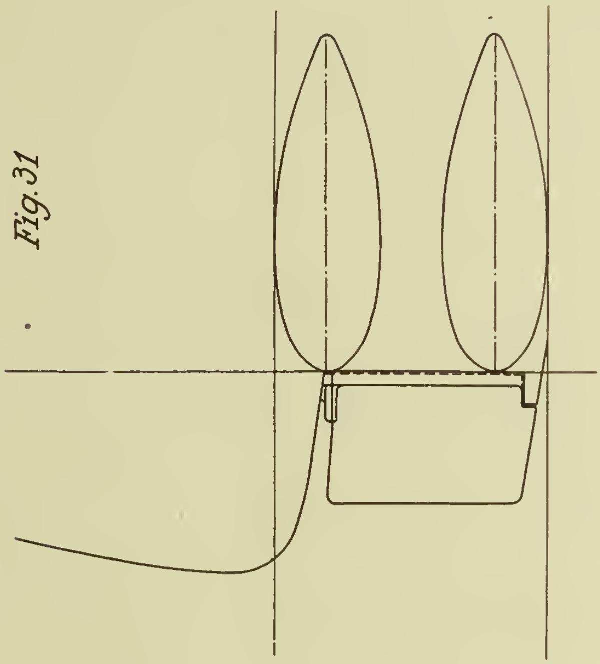
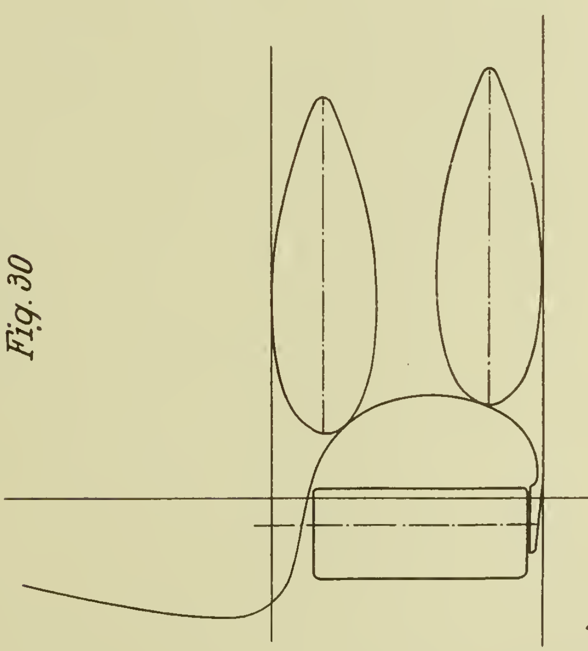


Fig. 30



INVENTOR
E. Klindwort

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. KLINDWORT

SHIP FORM

Filed March 13, 1941

Serial No.

383,215

10 Sheets-Sheet 10

Fig. 32

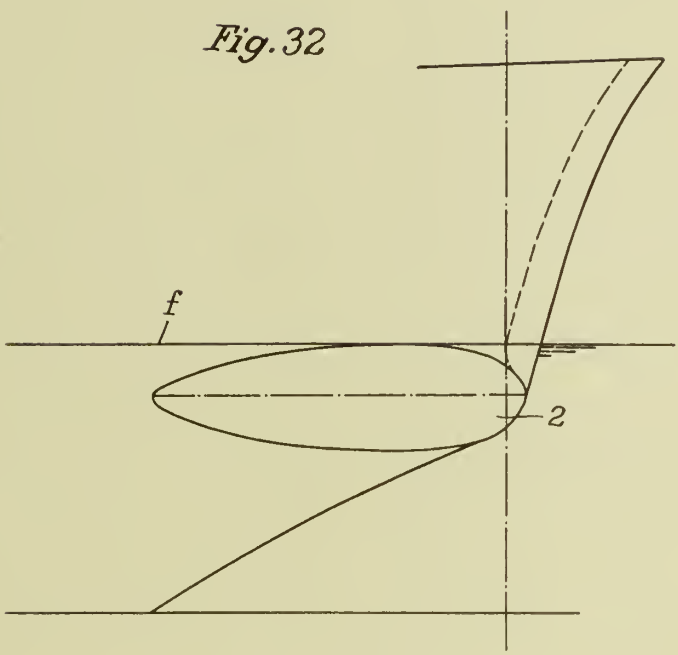
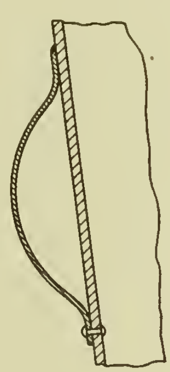


Fig. 33



Inventor

E. Klindwort

By: Glascock Downing & Seebold

Attys.

Published May 11, 1943 Serial No. 383,243

ALIEN PROPERTY CUSTODIAN

METHOD OF ELIMINATING IMPURITIES CONTAINED IN IRON AND STEEL, AND VACUUM OVEN HEATED BY GLOW DISCHARGE, MORE PARTICULARLY ANNEALING AND MELTING OVEN ADAPTED TO CARRY INTO EFFECT SAID METHOD

Wilhelm Burkhardt, Berlin - Grunewald, Germany; vested in the Alien Property Custodian

Application filed March 13, 1941

It is common knowledge that the impurities contained in iron and steel have an adverse effect on the properties of the material. Impurities, such as sulfur, phosphorus, arsenic, silicon, oxygen, or oxygen compounds, such as oxydes, are difficult to eliminate. They are found in every industrial iron or steel in small percentages. It is the object of the present invention to eliminate such impurities from the solid article to a considerable extent and to improve the mechanical properties of the treated material.

The invention relates to a method of eliminating impurities contained in iron and steel articles and is distinguished by the fact that the articles to be treated are kept in a gas discharge at a temperature of 500° C for a long duration, i. e. longer than it would be necessary for the elimination of gases. Advantageously, the article hereby is heated to a temperature in excess of 600° C, for instance to 1000 or 1100° C, at the highest limit up to the solidus point (fusibility point). As filling gas it can be used an inert gas, for instance a noble gas, or particularly a reducing gas, for instance hydrogen or hydrogen compounds. The subatmospheric pressure is between 5 to 0.001 mm Hg. The article can then be separated from the cathode or be connected as cathode. The method of the invention may be used for half-finished products or finished products.

If the article is connected as cathode and hydrogen is used as filling gas, the article when connected up as cathode is intensely loaded with the ionized hydrogen. This ionized atomic hydrogen entering the article is, at the prevailing temperature, easily capable of reducing oxydes and forming volatile hydrogen compounds with other impurities, such as sulfur, phosphorus, arsenic, etc. which volatilize at the prevailing subatmospheric pressure. In order to be able to keep the percentage of hydrogen small and yet to obtain an economical gas discharge heating under favorable current-voltage conditions, another gas, for instance, a noble gas, is admixed to the hydrogen. The liberated hydrogen compounds and sulfur and phosphorus vapors respectively are flushed out of the oven by the continuous supply of filling gas and current maintenance of vacuum.

For instance, it has been treated an article consisting of chrome-nickel steel and having the following dimensions: length 177 mm, outside diameter 145 mm and 22.5 mm thickness at a temperature of 1000° C in the presence of hydrogen gas at a pressure of 4 mm Hg, for 40 hours, after the elimination of gases had been stopped since 4 hours. By this treatment the tensile strength of the material of 100 kg/mm^2 was increased up to 145 kg/mm^2 at the same conditions.

This method has rendered it possible, at annealing times of up to 20 hours, to reduce by more than 50 per cent. the phosphorus and sulfur contents and also the oxygen content of the annealed material at a temperature of 900° C. At higher temperatures and by a longer annealing operation respectively it will be possible to reduce the impurities to a still higher degree. Purified alloy steels showed after the treatment an increase in strength of up to 40 per cent. at an almost constant elongation and in the case of ordinary carbon steel an increase in strength of up to 15 per cent. could be obtained, no account having been taken of the reduction in strength due to decarburization.

The invention further relates to a vacuum oven heated by glow discharge, more particularly annealing and melting oven, adapted to carry into effect the method referred to and which is distinguished by the fact that the wall thereof and the material to be annealed are connected up as electrodes of same sign, e. g., cathodes, and that one, two, or more insulated and screened, opposite electrodes, e. g., anodes, are lead in through the wall. Due to this mode of action and the interaction between the space charge fields, the advantage will be obtained that the oven may be operated on a lower voltage and higher current.

When operated by alternating current, the center tap or neutral point of the transformer is applied to the material to be annealed and the wall of the oven and free ends of the transformer are connected by a protective or stabilizing resistance to the electrodes led in through the wall the number of which electrodes corresponds to the number of phases. The stabilizing resistance however is suitably connected to the neutral wire leading to the transformer.

The device is diagrammatically and by way of example illustrated in the accompanying drawing which shows a section through a vacuum annealing and melting oven heated by gas discharge and operated by either direct current or two-phase alternating current.

The material 1 to be annealed rests on a metallic support 2 conductively connected to the wall of the oven. The oven is provided with a metallic lower part 3 and a detachable, vacuum-tight, set up, metallic upper part 4. The lower part is equipped with two jackets 5 and 6 and the upper part with two jackets 7 and 8. The gaps 22, 23 connected to the space of the oven and the gaps

20 and 21 situated between the wall of the oven and jackets and between the jackets respectively are chosen so narrow that no glow discharge in the gap is possible. The parts 24 and 25 are cooling jackets. Through the pipe socket 9 a filling gas may be supplied in regulated quantity for the maintenance of the desired subatmospheric pressure approximating 5 to 0.001 mm. mercury in the oven. The pipe socket 10 is connected to a vacuum pump. The parts 11 and 12 are two opposite electrodes, e. g., anodes, introduced into the chamber of the oven in an insulated and screened manner. The wires 14 and 15 lead to the cathode of a source of direct current or to the star-point 16 of a transformer 13 over a rheostat 26. The opposite electrodes 11 and 12 are connected to the positive pole of a source of direct current or to the free ends of a transformer. When operated by direct current, the glow fringe 17 forms around the article and the glow fringe 18 around the wall of the oven, whilst the positive column 19 is situated between both of them.

WILHELM BURKHARDT.

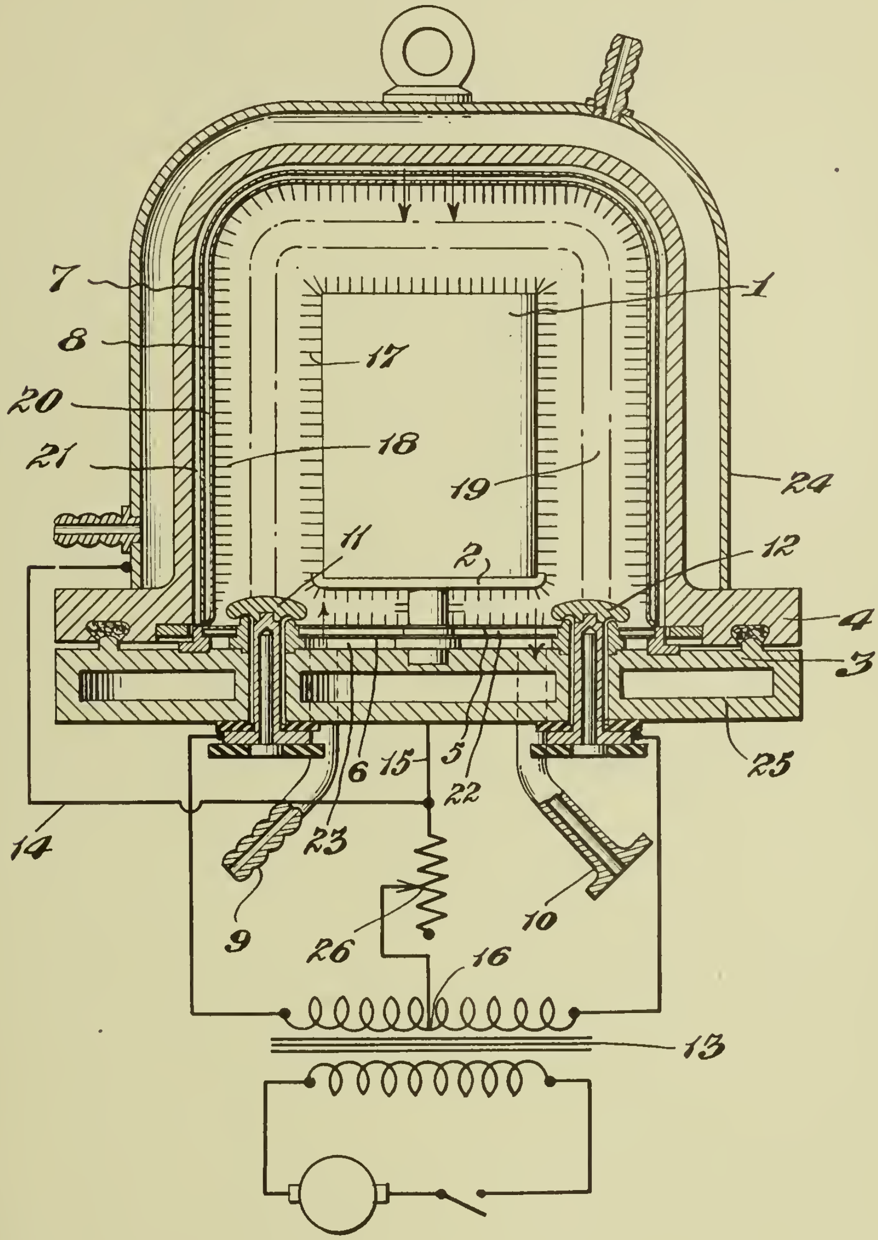
PUBLISHED MAY 11, 1943. BY A. P. C.

W. BURKHARDT

METHOD OF ELIMINATING IMPURITIES CONTAINED IN IRON AND STEEL, AND VACUUM OVEN HEATED BY GLOW DISCHARGE, MORE PARTICULARLY ANNEALING AND MELTING OVEN ADAPTED TO CARRY INTO EFFECT SAID METHOD

Filed March 13, 1941

Serial No. 383,243



Inventor,
Wilhelm Burkhardt
By: Glascock Downing & Seebold
Attorneys.

Published May 11, 1943 Serial No. 383,510

ALIEN PROPERTY CUSTODIAN

FUEL INJECTION TYPE INTERNAL COMBUSTION ENGINE HAVING A WHIRL CHAMBER

Anton Pischinger, Cologne-Deutz, and Friedrich Antweiler, Cologne-Dellbruck, Germany; vested in the Alien Property Custodian

Application filed March 15, 1941

The invention relates to fuel injection type internal combustion engines in which air is compressed in the cylinder and the fuel ignited spontaneously. More particularly, it relates to an engine of this type, wherein the air is forced from the piston chamber into a separate whirl chamber, through a connecting duct, which opens into the whirl chamber tangentially, the fuel being injected into the whirl chamber.

In machines of this kind the air current circulating in the whirl chamber crosses the fuel jet also in the vicinity of the injection nozzle, where the fuel jet has just been released and still consists of relatively large drops of fuel. The air current deflects a part of these drops away from the direction of the fuel jet and drives them against the wall of the whirl chamber, where they remain hanging and become coked, so that they are prevented from yielding their energy.

This disadvantage is avoided, in accordance with the invention, by deflecting the air current circulating in the whirl chamber, either by a shield arranged, with reference to the direction of the air current, in front of that part of the fuel jet next to the injection nozzle; or by a shield arranged, with reference to the direction of the air current, behind the said part of the fuel jet, by which shield the fuel is deflected from the part of the wall of the whirl chamber which is in danger of being sprayed.

In the drawing, several embodiments of the invention are represented.

Fig. 1 is a vertical section through the upper portion of a cylinder showing a cylindrical whirl chamber with means for shielding the fuel jet;

Fig. 2 is a section on the line II—II of Fig. 1;

Fig. 3 is a vertical section of a spherical whirl chamber showing means for deflecting the air current from the wall of the whirl chamber;

Fig. 4 is a horizontal section on the line IV—IV of Fig. 3;

Fig. 5 is a vertical section of a pear-shaped whirl chamber showing means for deflecting the air current from the wall of the whirl chamber;

Fig. 6 is a vertical section of a pear-shaped whirl chamber similar to Fig. 5, but with a slight modification in the shape of the deflecting means.

In Figs. 1 and 2 is shown a cylindrical whirl chamber *a*, connected with a piston chamber *b* by a duct *d*, opening tangentially into the whirl chamber, so that the air compressed into the whirl chamber from the piston chamber circulates in the direction of the arrow. The fuel is injected into the whirl chamber through an injection nozzle *e*. A shield *f* stands, with reference to the direction of circulation of the air, in front of that part of the fuel jet nearest the injection nozzle. The shield deflects the air current around the fuel jet, in the vicinity of the nozzle. The air current therefore does not come in contact with that part of the fuel jet which has just been released and which still contains relatively coarse drops of fuel; consequently the coarse drops cannot be deflected from the direction determined by the injection. Only in the opposite end of the whirl chamber, where the fuel jet has been reduced to the finest fog, is it engaged by the air current and thereby distributed through the whole inner space of the whirl chamber.

In the embodiment shown in Figs. 3 and 4, a spherical whirl chamber a' has a communication duct d'. In place of a deflecting shield located in front of that part of the fuel jet nearest the injection nozzle, a deflecting shield *g* is provided behind the fuel jet, which deflects the air current after it has crossed the fuel jet and turns it sharply in the direction of the axis of the fuel jet and thereby at the same time away from the wall of the whirl chamber. Consequently the path of flight of the drops picked up by the air current is not directed along the path indicated by the dash line *x*, against the wall of the whirl chamber, but along the flat curve indicated by the dotted line *y*, approximately parallel to the direction of the jet and thence back into the cone of the fuel jet. Along the long path *y* the fuel drops have ample time to atomize into the finest fog.

In place of deflecting shield *g* the wall of the whirl chamber may have an abrupt change of direction, by which the deflection of the air current away from that part of the whirl chamber in danger of being sprayed is achieved. In Fig. 5 the whirl chamber a^2 passes over abruptly into a cylindrical chamber *h*, at the end where the injection nozzle is located, the cylindrical chamber being coaxial with the cone of the fuel jet. The wall of the cylindrical chamber, which is parallel to the axis of the fuel jet, deflects the air current in a direction parallel to the axis of the fuel jet and at the same time away from the wall of the whirl chamber.

In place of the cylindrical chamber *h* shown in Fig. 5, there can be used a hemispherical chamber, as shown in Fig. 6. The embodiment shown in this figure is otherwise the same as that of Fig. 5.

The invention is not limited to whirl chambers which, at the end of the compression stroke, have taken up approximately all of the combustion air, but it can also be used in a pre-ignition chamber of whirl chamber shape.

ANTON PISCHINGER.
FRIEDRICH ANTWEILER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. PISCHINGER ET AL
FUEL INJECTION TYPE INTERNAL COMBUSTION
ENGINE HAVING A WHIRL CHAMBER
Filed March 15, 1941

Serial No.
383,510

Fig. 1

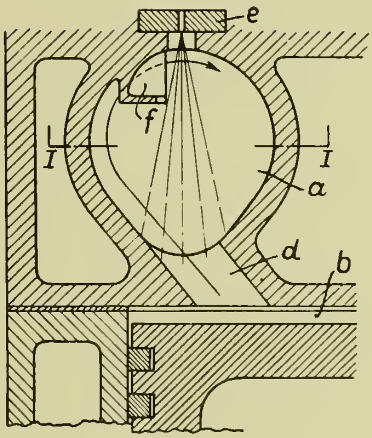


Fig. 3

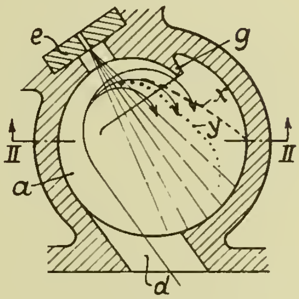


Fig. 4

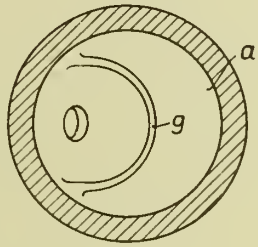


Fig. 2

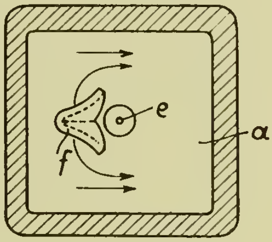


Fig. 5

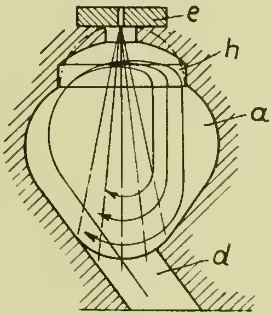
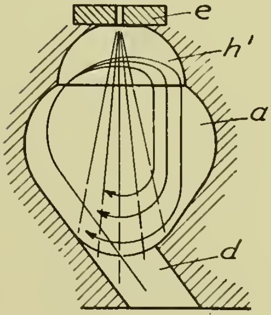


Fig. 6



Inventor:

ALIEN PROPERTY CUSTODIAN

RUBBER CUSHIONING DEVICE AND RUBBER CUSHIONING ELEMENTS ADAPTED FOR USE THEREIN

Nicolaas Sluyter, Haarlem, Netherlands; vested in the Alien Property Custodian

Application filed March 17, 1941

The invention relates to a rubber cushioning device and rubber cushioning elements adapted for use therein for various purposes, such as the cushioning of seats in motor-cars, busses and other vehicles, mattresses, chair seats, arms and backs of chairs, etc.

The invention is based on the insight that by suitably shaping the walls of hollow rubber elements a very convenient and comfortable cushioning means is obtainable which may be adapted to various purposes.

It is also based on the insight that a flat rubber strip, or a flat- or smoothwalled rubber tube section, which elements in their original shape are unsuitable for cushioning purposes, by deforming or denting obtain a larger resistance than tubular members or strips, which have not been brought under pre-tension by such a deformation or impression or dent. Keeping this in mind the invention consists in a rubber cushioing-device, the, or each, cushioning-element by local impression or deformation, e. g. by bending, from an original untensioned condition being brought and kept in a condition in which it is under pre-tension and in which it has the shape suitable for exerting its cushioning effect in the cushioning device.

Alternatively, the invention consists in this that of the, or each, rubber cushioning element, that entirely or partially encloses an interior space, the wall, confining said space, has a corrugated configuration, or such a curved configuration that an oval or similar oblong cross section is obtained.

Within this general principle various practical embodiments according to the invention are possible.

Thus, according to the invention, the, or each, cushioning element of the ruber cushioning device may consist in a rubber tube section, the ends of which constitute the supporting- and carrying surfaces and the axial section of which has the corrugated configuration referred to above.

Further, according to the invention, the, or each, cushioning element may consist in a rubber tube section the two oppositely lateral surfaces or wall portions of which constitute the carrying or supporting surfaces and the cross section of which has the corrugated configuration, or the curved configuration such that an oval or similar oblong section is obtained.

Cushioning elements according to the two embodiments referred to above may, either separately or in the required number, constitute the cushioning device of various objects. Thus, the number of suitably spaced cushioning elements may constitute the cushioning means of a seat. Also one cushioning element according to the first embodiment may constitute the spring of an automatic door shutter and one element according to the second embodiment, the cross section of which has corrugated walls, or e. g. is oval, may serve as the cushioning means of e. g. an arm of a chair.

The corrugated configuration of the axial section may also be obtained by making a helically wound groove in the wall of a rubber tube section, in which case a so-called rubber spiral spring is obtained in which, however, the windings are interconnected.

The corrugated configuration of the axial section may further according to the invention be obtained by means of one or more rings the inside diameter of which is smaller than the outside diameter of the rubber tube section in tensionless and unloaded condition, which rings, spaced from one another, encompass and locally contract the tube section.

The corrugated configuration according to the invention may also be obtained by one or more rings, the outside diameter of which is larger than the inside diameter of the rubber tube section in tensionless and unloaded condition, which rings, spaced from one another, are arranged within the tube section and are locally forced outwardly.

Within the spirit of the invention further is an embodiment in which the wall of the, or each, cushioning element is provided with relatively offset wall portions defined by two different mutually parallel main planes, said wall portions constituting the carrying and supporting surfaces and merging into one another along corrugated intermediate wall portions which, on the one hand, with the carrying wall portions, on the other hand with the supporting wall portions, confine hollow spaces open towards opposite sides.

A cushioning device of this type is also very suitable for an arm of a chair or the like.

Besides a cushioning device comprising one or more cushioning elements according to the invention the invention also includes the cushioning elements in themselves in the condition in which they are under tension as well in the condition without any pre-tension. The invention therefore includes rubber elements in the shape of rubber tube sections the wall of which is provided with spaced circumferential grooves produced in the course of the manufacture of the

tube section. The said grooves may serve to receive the above-mentioned e. g. metal rings which after being mounted bring the rubber element under a predetermined tension. The cushioning device may have an additional tension produced by compression in axial direction.

When using rubber cushioning elements having an oval or similar oblong section in which the tendency to rock in a plane perpendicular to the axis is larger than in the vertical plane through the axis, this tendency may be counteracted by arranging according to the invention the axes of the cross sections of adjacent elements or cells perpendicular to one another and by interconnecting the elements.

Also, according to the invention, two or multiple cell-cushioning devices may be obtained by producing two or more rubber cushioning elements already during their manufacture consequently with common intermediate walls.

In order to obtain a more full idea about the possibilities of the invention, some embodiments thereof, to which, however, the invention is not limited, are shown in the drawing by way of example.

In the drawing is:

Fig. 1 an axial section of a cushioning element according to the invention, at the left in the initial condition without pre-tension and at the right under tension.

Fig. 2 is an axial section of a modification thereof.

Fig. 3 is an elevation of a cushioning element with helically wound groove and

Fig. 4 with spaced parallel circumferential grooves in the outer wall.

Fig. 5 is a perspective showing of a modified embodiment and

Fig. 6 is a corresponding showing of a modification thereof.

Figs. 7, 8 and 9 are perspective showings of three embodiments of multiple-cell-cushioning-elements with corrugated wall.

Fig. 10 is a perspective showing of a multiple-cell-cushioning-element with cells having an oval cross section.

Fig. 11 is a perspective showing of two adjacent cells of a multiple-cell-cushioning-device in which the axes of the cross sections of said cells are perpendicular to one another and the cells are interconnected.

Fig. 12 relates to a further embodiment very suitable for a seat or mattress.

According to Figure 1 the rubber cushioning element comprises a rubber tube section 1, the wall of which at the exterior is provided with spaced superposed circumferential grooves 2. At the ends the edges 3 and 4 are directed inwardly. In Fig. 2 rings 5 of rubber or of stiff material are arranged in the grooves 2, whereby the cushioning element is brought under pre-tension and is somewhat shortened. Thereby the edges 3 and 4 have been brought in a flat plane. A similar cushioning element may e. g. be mounted in a seat, the ends then constituting the carrying and supporting surfaces adapted to be connected with parts of the seat. To this latter end e. g. press button closures may serve but other connecting means are of course also possible.

According to Figure 2 the rings 6 are located at the exterior instead of at the interior, as in Fig. 1. The rubber tube section 1 is in this case, at the left in Fig. 1, provided with external circumferential ribs and internal circumferential grooves and with outwardly directed edges 3 and 4 which, at the right in Fig. 2, are positioned in a flat plane. In both cases the wall in the axial section is corrugated.

In Figure 3 the corrugated configuration of the wall in the axial section is obtained by a helically wound groove 7 produced during the moulding of the rubber tube section.

In Figure 4 the circumferential grooves 8 are also produced during the moulding of the tube section.

The elements according to Figures 3 and 4 as well as those according to Figures 1 and 2 are very suitable in cushioning devices for seats, provided they are used in the required number.

In Figures 5 and 6 cushioning elements are shown which may be used e. g. in arms of chairs.

In the cross section the element according to Figure 5 has two oppositely located corrugated walls 9 and 10, each having one groove.

In Fig. 6 the corresponding walls have a plurality of corrugations 11. The carrying and supporting surfaces are denoted by 12 and 13.

In Fig. 7 a cushioning wall is shown having a plurality of rubber cells 14 each with two corrugated oppositely located walls in which the adjacent cells have common intermediate walls.

In Figs. 8 and 9 the same main idea is realised, however, the oppositely located corrugated cell walls 15 and 16 are corrugated otherwise.

In Fig. 10 the cells 17 have an oval cross section.

In Fig. 11 it is shown that the axes of the cross sections of two adjacent cells 18 and 19 are perpendicular to one another. This principle may be applied to more than two cells.

In Fig. 12 the rubber wall 20 is meandershaped; this wall confines only partially enclosed interior spaces 21. The corrugated configuration is also present here. A lower layer, e. g. of wood, is denoted by 22 and an upper layer, e. g. a cingle, by 23, to which layers the rubber wall is attached, preferably in a removable manner to the cingle.

The cushioning elements in which the axial or the cross section shows corrugated walls may, according to the invention, be stiffened by thickening the material at the plane of the tops of the corrugations. The bending through is thereby somewhat counteracted. In the drawing this has not been shown.

If for the cushioning element it is started from an originally substantially flat strip of rubber, then this strip according to the invention may have a centrally depressed curved portion which, after the strip is bent into the operative position corresponding to a tubular shape with interruption between the longitudinal edges of the strip, has become more or less flat or plane and then constitutes a satisfactory seat, e. g. for cingles, which may be attached thereto by means of press-button closures or otherwise. The longitudinal edges of the strip in tubular form may be clamped e. g. between spacing slats. The mutual distance of the cushioning elements may be chosen such that in the case of the deepest bending through or denting the places of maximum lateral deflection engage one another.

NICOLAAS SLUYTER.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

N. SLUYTER
RUBBER CUSHIONING DEVICE AND RUBBER CUSHIONING ELEMENTS ADAPTED FOR USE THEREIN
Filed March 17, 1941

Serial No.
383,860
2 Sheets-Sheet 1

Fig. 1.

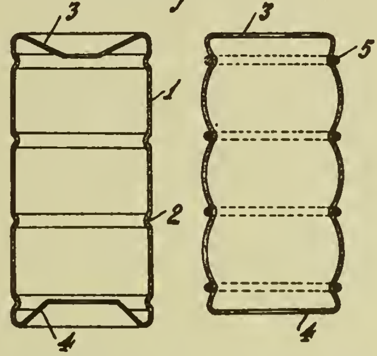


Fig. 2.

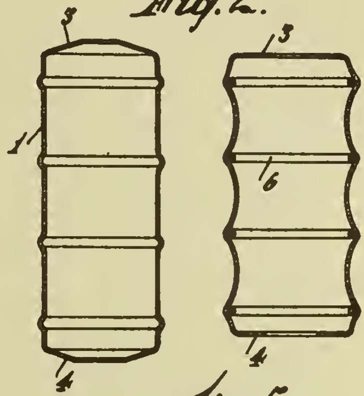


Fig. 3.

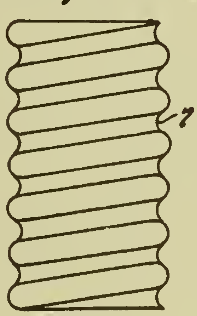


Fig. 4.

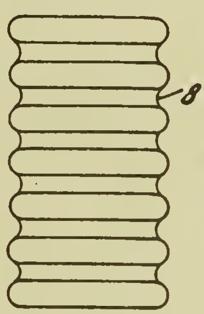


Fig. 5.

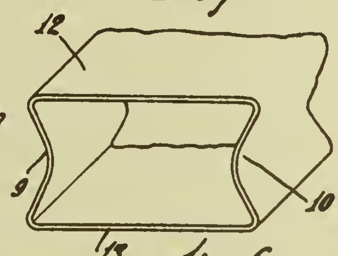


Fig. 6.

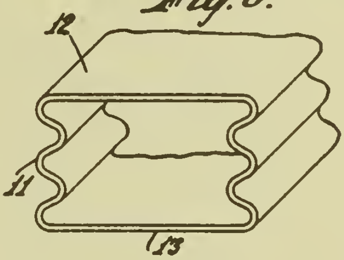
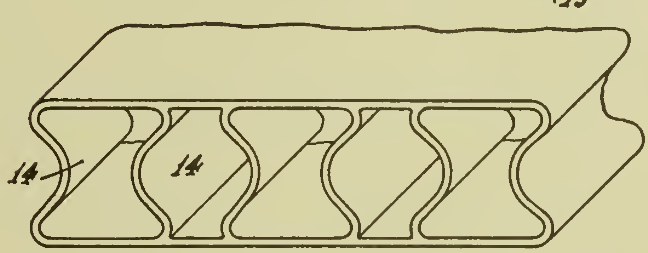


Fig. 7.



Inventor:
N. Sluyter
By E. F. Wenderoth
Atty

PUBLISHED

MAY 11, 1943.

BY A. P. C.

N. SLUYTER

RUBBER CUSHIONING DEVICE AND RUBBER CUSHIONING ELEMENTS ADAPTED FOR USE THEREIN

Filed March 17, 1941

Serial No. 383,860

2 Sheets-Sheet 2

Fig. 8.

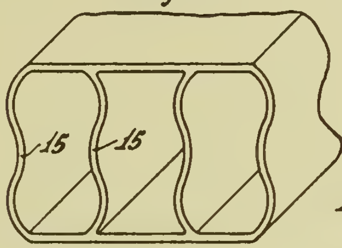


Fig. 9.

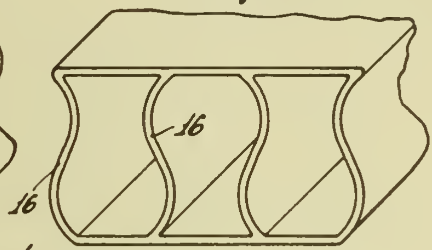


Fig. 10.

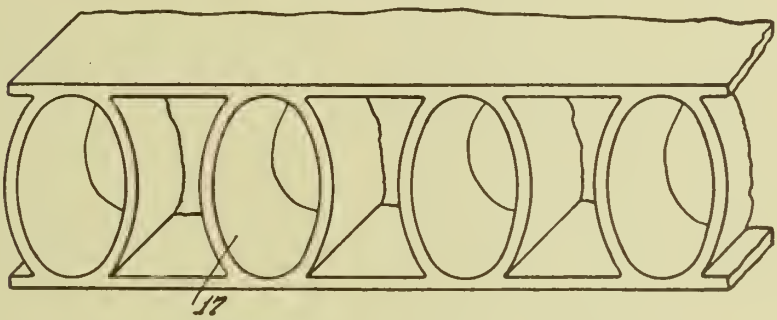


Fig. 11.

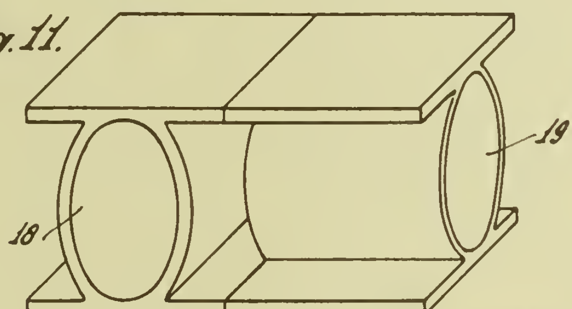
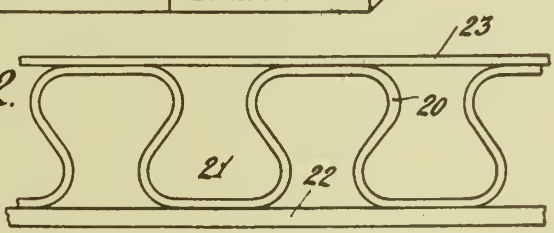


Fig. 12.



Inventor:
N. Sluyter
By E. F. Wenderoth
Atty

Published May 11, 1943

Serial No. 384,006

ALIEN PROPERTY CUSTODIAN

BREATHING APPARATUS FOR RESPIRATION AT HIGH ALTITUDES

Rodolfo Margaria, Milano, Italy; vested in the Alien Property Custodian

Application filed March 18, 1941

The breathing apparatus used heretofore at high altitudes and generally where air is rarefied are not very rational because they do not allow a sufficient increase in the breathing mixture, and because not all the whole amount of oxygen supplied is utilized for breathing.

Recently Boothby and Lovelace (see the review "Aviation Médicine" No. 9 of the year 1938, page 172) have described a type of breathing mask, answering rather well to its object, but having yet the drawback of allowing the respiration of a part of the expired air, which should be useful to increase the resistance to "anoxaemia".

As one of the applicants has shown (R. Margaria in Giornale di Medicina Aeronautica 1939-2) it has been finally established that such a practice instead of being an advantage is useless and altogether harmful.

The object of the present invention is an apparatus for supplying oxygen for breathing in rarefied air, according to which the supply of this gas to the lungs is adjusted so as to obtain the best possible utilization of the oxygen supplied.

The apparatus is characterized by means supplying first directly to the alveoli of lungs an amount of gas O_2 pure, which in said alveoli is mixed with already enriched air, driven out of the said alveoli to occupy the respiratory channels during each expiration for returning during the subsequent inspiration in said alveoli and by means which subsequently supply the atmospheric air poor in oxygen to the respiratory channels, driving it out in the atmospheric air during the subsequent expiration.

This apparatus allows to supply to the lungs first a suitable amount of pure oxygen and subsequently, the outer atmospheric air poor in oxygen: thus the oxygen enters entirely in the alveoli of the lungs, where it mixes with the inspired surplus of air, whilst in the respiratory channels, where no gaseous exchanges with the blood take place there is only the outer atmospheric air, poor in oxygen.

During the subsequent expiration this poor air of the respiratory channels is immediately driven out and at the end of the expiration there will remain in said channels the rich air formerly contained in the alveoli so that this air, in the subsequent inspiration, will be again drawn into the alveoli and will therefore be utilized.

The calculations of the amount of oxygen to be supplied, may therefore be based on the alveolar ventilation, instead of being based on the whole lung ventilation so that there is a great saving in the supplied oxygen.

The invention is illustrated in a practical embodiment thereof in Fig. 1 of the accompanying drawing, while Fig. 2 shows a diagram permitting the supplying regulation, in relation to the different altitude conditions, and consequently of air rarefaction.

The apparatus consists in two parts: one A of a reduced capacity, has preferably the form of a cylinder, closed at the top and open at the bottom base and is formed with rigid materials, for instance with metal, ebonite, synthetic resins or the like: it is divided by a diaphragm C into two superposed chambers A'—A''. The diaphragm C presents a valve M controlling the passage between the two chambers A' and A'' as will be disclosed hereinafter.

On the lower chamber A'', open at the bottom, is fitted, perfectly tight, a bag B, preferably in rubber, whilst chamber A' is connected by pipes D, E which enter into tubes F, G of a rubber nose-cover H, provided with fixture straps I, said cover fitting onto the nose of the operator so that the supply of the gases for breathing is provided solely through the nose cavities. The mouth remains entirely free, so that the pilot or the airplane passenger may talk, eat, vomit, without requiring any removal of the mask and without any interruption in the supply of the oxygen.

The chamber A' of member A communicates by means of an inhalation check-valve M, with chamber A'' and therefore with bag B, there being thus two chambers of a very different volume capacity, since normally the volume capacity of the bag is about 1½ liters.

Pure oxygen flows constantly in said capacity formed by bag B and by chamber A'' from a tube N traversing the wall of A'' out of a bottle,—(not represented in the drawing)—provided with a pressure reducing valve and with a flux-meter (also not shown in the drawing).

On the side-wall of chamber A'' is provided an inhalation valve O allowing outside air to enter the bag B, but preventing the oxygen contained in said bag from leaking out.

When the user commences an air inspiration, first only valve M opens, and the oxygen contained in the bag B flows into the lungs; only in a second period of time, it can overcome the resistance of valve O which opens and outside atmospheric air, poor in oxygen, is drawn in. Valve L will naturally remain closed.

In this manner the oxygen collecting in bag B

enters directly in the lungs alveoli and will be entirely utilized, being mixed only at the end of the inspiration and only partially with the rarefied air, so that a smaller oxygen quantity can be supplied than in the case that the mixing would be formerly effected and utilized for breathing; effectively oxygen enters in all alveoli and respiratory channels are only occupied by the very poor atmospheric air.

In exhaling, the air passes from the nostrils to tubes F G D E into chamber A. Valve M closes and valve L opens, and out of said valve L flows the whole air occupying the respiratory channels, while the enriched air which flows out of the lungs occupies the respiratory channels. In the subsequent inspiration this formerly enriched air, returns to the lungs with a fresh quantity of oxygen, so that a new utilization takes place.

Valves L, M, O are formed with rubber or mica membranes and may have any suitable structure.

In order to better show the advantages of the present invention, in Fig. 2 a diagram is given showing the amount (in liters, at 0° Cent. temperature and 760 m/m mercury pressure) of oxygen to be supplied, in relation to the altitude in kilometers above the level of the sea, which is the most important application for the living in aeroplanes flying at high altitude; similar considerations could naturally be made for air rarefield for others whatever causes.

The amount of oxygen supply to maintain a high partial pressure of oxygen in the alveoli, namely a pressure equal to that obtaining at sea level—varies of course with the ventilation of the lungs (or of the alveoli). It is well known that the latter varies in linear proportion with individual metabolism, at least up to values of the same which are not excessive and that each liter of expired air corresponds to an energy consumption of about 0.25 calories. (See R. Margaria Transactions of the Reale Accademia dei Lincei Series VI Vol. VII part V 1938 at page 359).

A man resting in a chair, consumes 1 calory per minute; when he moves now and then the arms or the legs as a pilot does in usual practice, the metabolism or energy consumption does not exceed two calories per minute. The lungs ventilation, viz. the amount of air inhaled and exhaled every minute, for the case considered of an energetic consumption of two calories per minute, will be 8 liters, as every 0.25 calories consumed correspond to 1 liter of exhaled air.

Supposing the frequency of respiration, namely the number of inspirations per minute, to be 15, the depth of respiration will amount to 533 cubic centimeters and, supposing the clearance volume for respiration to be 150 cubic centimeters the alveolar respiration will amount to 5.75 liters, as obtained by subtracting said clearance volume from the breathing depth and then by multiplying the result by the breathing frequency.

The amount of oxygen to be supplied in order that, in addition with air, it should provide such a dose as would maintain the partial pressure of oxygen as obtained at sea-level, is shown, for the case in consideration, in the diagram Fig. 2.

Said diagram has been plotted, taking into consideration the increase in volume of the gas due to the decrease of atmospheric pressure and considering also that said gas within the lungs is at 37° Cent. and saturated with water vapour, wherein the partial pressure is 47 mm. mercury column.

It is apparent that with the breathing apparatus specified above, both pilot and passengers of a civil aircraft, on using only 1.3 liters of oxygen per minute, can fly up to 10.000 meters altitude, remaining exactly in the same condition, concerning respiration exchanges, as if they were at sea-level. If on the contrary the calculation should be based on lung ventilation (8 liters instead of 5.75 in the above case) the amount of oxygen required in the same conditions would rise to 1.7 liters.

As mentioned above, the apparatus specified is shown merely as an example of embodiment of the invention. It may be varied in dimensions, in the shape of its various parts, provided it should achieve the method for supplying oxygen as claimed in the present invention.

So, for instance, pipe N supplying oxygen, might be extended further downward—towards the bottom of bag B; the expiration valve L, instead of being placed sideways, might be placed in front of chamber A' etc. Also the apparatus might be provided, with some accessory, as for instance a corrugated pipe to be inserted between part A carrying the valves and the nose attachment (or any other suitable point) thus allowing the pilot more freedom in the movements. Also the straps for holding the nose-cover applied to the face might be of any proper shape.

RODOLFO MARGARIA.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. MARGARIA
BREATHING APPARATUS FOR RESPIRATION
AT HIGH ALTITUDES
Filed March 18, 1941

Serial No.
384,006

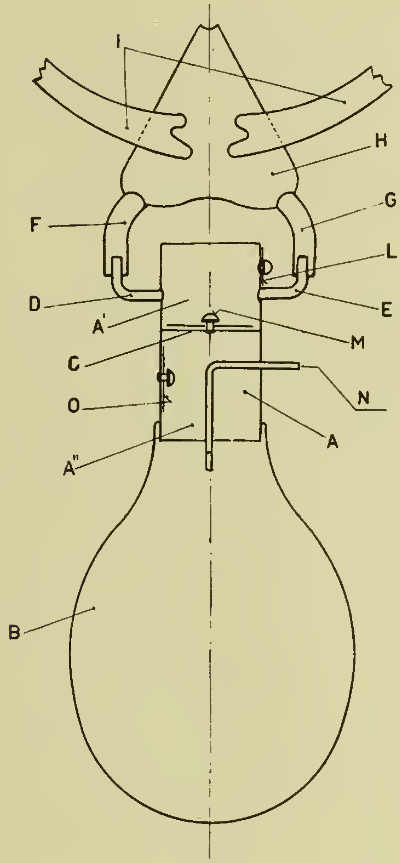


Fig. 1

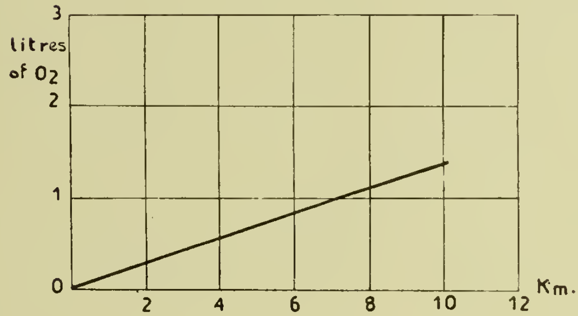


Fig. 2

Inventor

Rodolfo Margaria

By Young, Emery & Thompson

Attorneys

Published May 11, 1943 Serial No. 384,197

ALIEN PROPERTY CUSTODIAN

TOOLS FOR CHISELLING OUT GROOVES OR CHANNELS IN HARD SURFACES, ESPECIALLY IN WALLS

Ottmar Schilling, Greifenstein on the Danube, Germany; vested in the Alien Property Custodian

Application filed March 19, 1941

invention relates to improvements in tools iselling out grooves or channels in the surfac of hard layers say of wood or especially of brickwork, these grooves or channels being destined to receive conduits for electric current, gas, water or the like and has for its object the provision of a tool, enabling a more expeditious and simpler production of such grooves or channels by simultaneously cutting out both longitudinal side walls of such grooves or channels.

A further object of the invention is to provide a tool adapted to produce grooves or channels with different inner width, using the same constituent parts of such a tool.

Heretofore chiselling out of such grooves has been done with a chisel of usual length of its cutting edge along two parallel marking lines by repeated and successive putting of the chisel with its cutting edge on the marking line, driving it in and removing it out of the brickwork, the chiselling out being done first along one marking line and thereafter along the other line whereas the tool of the invention enables simultaneous cutting along two parallel lines.

The tool according to the present invention consists in essence of a head provided with a handle and adapted to receive the blows of an iron or a wooden hand hammer, this head being provided with a pair of jaws in the shape of chisels or knives the cutting edges of which are parallel to and distant from each other.

The cutting edges of these chisels or knives are preferably essentially longer than those of chisels usually employed for work of this kind.

In the preferred embodiment of the invention the chisels or knives are removably fixed unto the head and thereby may be substituted by another pair of chisels which have different shape and dimension. Furthermore each chisel of a pair thereof is interchangeable for the other similarly shaped chisel or for a chisel of another shape or dimension. By such an arrangement it is feasible to produce grooves or channels of different breadth not only by means of the same head by using pairs of chisels of different shape or by exchanging one chisel of spacial shape for the other of the same special shape, but also by using pairs of similarly or differently shaped chisels in combination with heads of varied dimensions.

In most cases it is sufficient to provide for the preferred embodiment of a tool in which the chisels have their cutting edges somewhat distant from the middle plane of such part of the chisel which serves to connect it to the head. In this case when turning one or both of the chisels for 180° it is possible to obtain besides the normal position one or two additional positions of the chisels in which the distance between the parallel cutting edges is longer or smaller. Such a tool enables chiselling out of grooves of three different widths with the same head and with a pair of similarly shaped chisels.

The preferred shape of the chisels in which this latter has very long cutting edges enables to carry out chiselling out in the manner of a drawn cut by placing the cutting edges somewhat obliquely to the wall surface and displacing the tool in longitudinal direction simultaneously applying blows unto the head. In this manner, on the one hand, those parts of the chisel which have already entered the wall surface furnish a guide to the progressive movement of the tool and, on the other hand, a complete removal and a renewed putting of the chisels for applying blows is rendered unnecessary.

In the drawing one embodiment of the tool according to the invention is illustrated, Fig. 1 being a view, Fig. 2 a section on the line A—B of Fig. 1; Fig. 3 is an illustration of a chisel removed from the head.

The tool consists of a head **1** of an essentially parallelopipedic shape with a curved upper blow surface **2** and a handle **3**. Unto the undercut side faces **4**, **5** of the head apply the backs or clamping parts **6** of chisels or knives **7**, **8**, which are fixed thereon by screw-bolts **9**. The chisels or knives are provided either with an eye or with a slot **10** through which passes the screw bolt **9** having a screw nut **12**. The provision of a slot has the advantage in confront of an eye to facilitate applying the chisels unto the head **1**.

The chisels have preferably the contour of a rectangle (Fig. 3) and show an enlarged back or clamping part **6** and a tapering extension thereof or stem ending in the cutting edge **13**. This cutting edge is excentrically disposed to i. e. somewhat distant from and parallel to the longitudinal plane of symmetry C—D of the clamping part as illustrated in Fig. 2 in dotted lines. When turning one or both of the chisels on the axis of symmetry and fixing it respectively them to the head, their cutting edges furnish three different distances *a*, *b*, *c* between them so that with one and the same tool of this kind grooves or channels of three different breadths may be made.

The tool is held by its handle and placed unto the wall or layer to be chiselled out in such a manner that its cutting edges are somewhat oblique to the wall surface. In this position the tool is intermittently drawn longitudinally along

a marking line on the wall simultaneously applying blows unto the head by means of a hand hammer.

Those parts of the chisels which have entered the wall furnish a guide and thereby facilitate the drawing of the tool along the marking lines and cut out both side walls of the groove.

If desired one of the chisels may have a somewhat minor dimension in height of its stem in order to reduce the depth of the cut which it produces.

OTTMAR SCHILLING.

PUBLISHED

MAY 11, 1943.

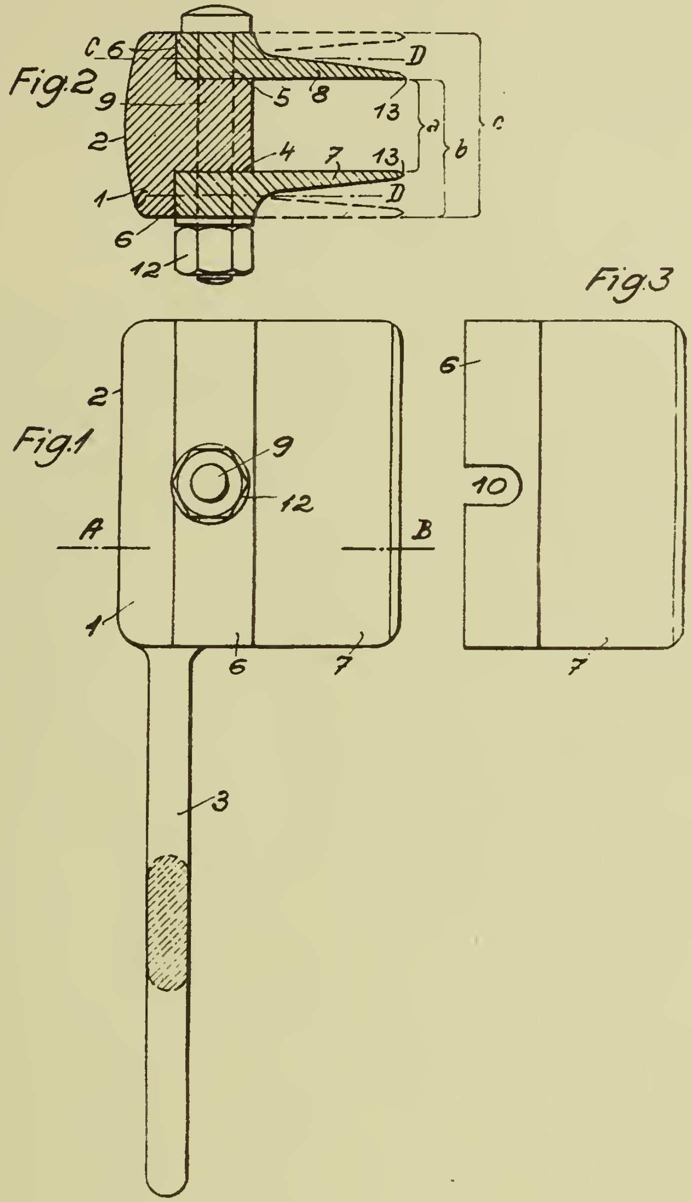
BY A. P. C.

O. SCHILLING

TOOLS FOR CHISELLING OUT GROOVES OR CHANNELS IN HARD SURFACES, ESPECIALLY IN WALLS

Filed March 19, 1941

Serial No. 384,197



Published May 11, 1943

Serial No. 384,730

ALIEN PROPERTY CUSTODIAN

FLOATING SWIVEL RINGS FOR NON-SKID CHAINS

Otto Bornemann, Berlin, Germany; vested in the Alien Property Custodian

Application filed March 22, 1941

The present invention relates to new and useful improvements in non-skid chains and it pertains more particularly to an improved conformation of the so-called floating swivel rings of such non-skid chains. Floating swivel rings, also called "gripper rings," are usually provided on those links of a non-skid chain which are disposed on the tread surface of a tire and thus are in contact with the road.

It is an object of the present invention to provide a new type of floating swivel rings which will efficiently protect the links of the non-skid chain from being too quickly worn out in use, will highly improve the gripping power of a non-skid chain mounted on a tire of a vehicle wheel, and also will effectively prevent the chain links from being covered with ice in which event their gripping effect would be practically annulled.

A further object of this invention is to provide a new type of floating swivel rings which will not be deformed by the high pressure and reaction forces to which they are subject in service. The swivel rings according to this invention are not easily deformed, so that they are capable under all circumstances of freely turning and axially moving on their respective chain links.

Still another object of this invention is to provide circular swivel rings having in a section taken through their axis of symmetry a shape elongated in a direction perpendicular to such axis, the body of said rings having thus an ovoid or elliptical or generally elongated cross sectional shape. As it will be seen from the following, such elongated conformation of the floating swivel rings will highly improve their resistance both to wear and to bending forces.

These and other objects of the invention will more fully appear from the following description of two preferred embodiments of same taken with reference to the accompanying drawing in which—

Fig. 1 represents a portion of a non-skid chain having on its left hand portion floating rings of a hereunto known type and on its right hand portion floating swivel rings made in accordance with the present invention.

Fig. 2 is an enlarged axial cross section of a floating swivel ring of a known type.

Fig. 3 is an enlarged axial cross section of a floating swivel ring according to one embodiment of this invention.

Fig. 4 is a similar cross section of a floating swivel ring according to another embodiment of this invention.

Fig. 5 represents in perspective view a non-skid chain provided with floating swivel rings according to this invention and mounted on a vehicle wheel.

Referring more particularly to Fig. 1 of the drawing the links of a tread portion of a non-skid chain are denoted by the reference mark **1**, the floating swivel rings of a known type are designed by reference mark **2**, whilst the floating swivel rings made in accordance with one embodiment of this invention bear the reference mark **3**. The links of the non-skid chain may be somewhat twisted in the usual way what has not been represented on Fig. 1. However Fig. 5 partly shows such provision.

The floating swivel rings according to this invention owing to the high stresses to which they are exposed, may be made—so as it is with the usual swivel rings—either from a special naturally hard steel or from a ductile material subsequently to be hardened on its surface in any known manner.

As illustrated by Fig. 2, the known swivel rings have their axial cross section of a true circular shape. In Figure 2 there is represented a floating swivel ring made either by bending from a ductile iron wire or by forging, swaging or stamping out from any suitable material having been subsequently treated by any known superficial hardening operation. The inner core of the ring body which has preserved its toughness is denoted by the reference mark **4**, while the outer hardened layer by the reference mark **5**. As represented, the hardened layer **5** of a known swivel ring **2** has a uniform thickness all around its core **4**, said latter still having a substantial cross-sectional area for the purpose of preventing a cracking of the swivel ring under the forces, liable to act under operation. It must be appreciated that the thickness of the hardening layer **5** can be but a limited one if the cross-sectional area of the inner tough core **4** is not to be reduced below a necessary minimum.

It has been found that most exposed to wear is the outer peripheral surface of a swivel ring. Thereby it occurred that with the known swivel rings of circular cross-section the hardened layer **5**, on the outer portion of the ring, was not sufficient to withstand the strong wearing action exerted by the road.

Therefore a floating swivel ring according to this invention is formed in an expedite way so as to be of ovoid or elliptical or generally elongated cross section provided at least with an outwardly projecting tapering part extending around the outer circular periphery of the float-

ing ring. Such is the case if the axial cross section of the circular ring body represents an outwardly tapering ovoid shape.

In Fig. 3 of the drawing a swivel ring according to this invention is represented having in axial cross section such an outwardly tapering ovoid shape. Owing to the core being elongated in an outward direction, such ring, when subjected to a hardening treatment, has its outer peripheral extremity and its tapering portion more deeply hardened and hence more resistant to wear than the lateral and inner parts of such ring. The thicker hardened layer **6** formed on the outer surface of the ring **3** may be clearly seen in Fig. 3.

Furthermore it should be appreciated that a swivel-ring of elongated cross section has a higher moment of resistance to bending forces acting from the outside towards the axis of such ring and tending to bend it or to flatten out its circular shape.

Thereby it may be seen that the elongated cross sectional shape of the swivel ring according to this invention provides both for its increased resistance to bending forces and to wearing action.

It has been found with the known swivel rings of circular cross sectional shape that their hardened layer **5** has been worn out on its outer side after a relatively short period of service. Thereby such rings have been exposed to an increased wearing effect and to an increased danger of being deformed to such an extent as to be jammed on their respective chain links. Such rings are no more capable of rotating and moving axially on their links wherefore they are going to be worn out not uniformly on their entire circular periphery but only at one part thereof. They are soon worn out to such an extent that they are easily broken away and lost, exposing thus the links of the non-skid chain to excessive wear. Moreover, if the swivel rings are jammed on their chain links, they are no more capable of preventing the accumulation of ice on such latter. Thereby the non-skid chain would lose its gripping power.

In the embodiment represented on Fig. 4 the floating swivel ring has an elliptical shape in axial cross section. During the hardening operation a hardened layer **5** is formed having a greater thickness both on the outer and on the inner side i. e. in those portions **6** and **7** of the ring which are nearest to and mostly remote from the axis of symmetry of the swivel ring. In this last mentioned embodiment of the invention the swivel ring is particularly well protected against wear both by its contact with the road and with its chain link.

As it has been explained above, the ovoid or elliptical cross-sectional shape of a swivel ring provides for its having a higher moment of resistance than if being made of circular cross section. Therefore merely by this provision it has been possible substantially to reduce the danger of such rings going to be deformed and jammed on their chain links. The high wear-resisting properties of the floating swivel rings according to this invention owing to the provision of an increased thickness of the hardened layer in those parts of the rings which are mostly exposed to wear have been explained above in detail. Furthermore it has been found that floating rings of ovoid and elliptical cross section will provide for a substantially increased gripping power of the non-skid chain on the ground. Finally the life of swivel rings having such cross section is considerably lengthened and thereby also the durability of the entire non-skid chain is substantially increased.

All of the above mentioned important advantages of the floating swivel rings according to this invention are obtained merely by forming the body of such rings in an elongated (ovoid or elliptical) axial cross-sectional shape. Furthermore it should be appreciated that the forming of a thicker hardened layer on those parts of such rings which are exposed to greater wear does not require more time than the forming of the heretofore usual hardened layer of uniform thickness around the body of the known swivel rings (Fig. 2). On the contrary, a hardening operation carried out on swivel rings according to this invention has an equal duration as that one carried out on swivel rings of the known type and it results in the inner core **4** being formed of substantially equal magnitude as with the known swivel rings. The thickness of the hardened layer obtained according to this invention on the less exposed parts of the ring body, is the same as that one of the hardened layer formed on the known swivel rings of circular cross section.

Though only two forms of floating swivel rings according to this invention and only one form of a non-skid chain provided with such floating rings have been represented, it has to be understood that various changes in the form, proportions, size and minor details of the structure of the floating rings and of the chain may be made without departing from the spirit or sacrificing any of the advantages of the invention.

From the foregoing it will be seen that the present invention provides a floating swivel ring in which the outer portion is (or in which the outer and inner portions are) particularly well protected against wear and wherein such ring is highly resistant to bending forces. Thereby the swivel rings according to this invention may freely rotate and be axially moved on their respective links, so as efficiently to protect them against the accumulation of ice and an excessive wear in use, while at the same time highly improving the gripping power of a non-skid chain. At the same time the swivel rings according to this invention are simple and cheap to manufacture.

OTTO BORNEMANN.

PUBLISHED MAY 11, 1943. BY A. P. C.

O. BORNEMANN

FLOATING SWIVEL RINGS FOR NON-SKID CHAINS

Filed March 22, 1941

Serial No. 384,730

Fig.1.

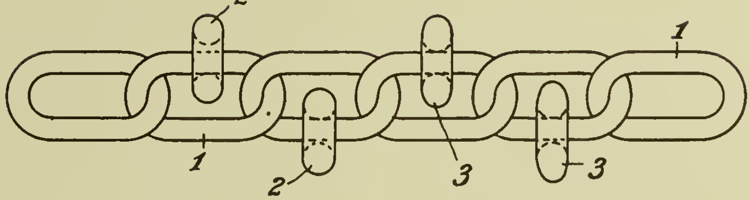


Fig.2.

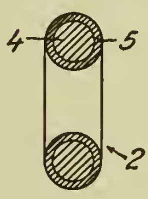


Fig.3.

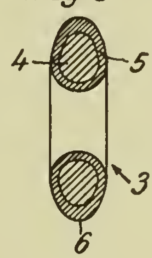
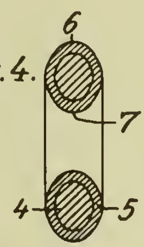


Fig.4.



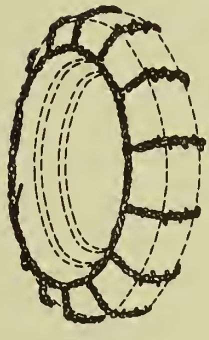


Fig.5.

Inventor
OTTO BORNEMANN
By Young, Emery & Thompson
ATTYS.

Published May 11, 1943

Serial No. 385,034

ALIEN PROPERTY CUSTODIAN

ARRANGEMENT FOR PRODUCING FILTERS

Manfred von Ardenne, Berlin-Lichterfelde-Ost, Germany; vested in the Alien Property Custodian

Application filed March 24, 1941

This invention relates to an arrangement for producing filters.

To produce surface filters and ultra-filters which have the properties of an ideal filter it is known in the art to burn in a foil with the aid of ion rays perforations of constant magnitude and form and in a desired spaced relation from one another.

The object of the present invention is to provide an arrangement, whereby the greatest possible number of very fine perforations are burnt in a filter film so as to reduce the filter resistance (resistance to flow). This may be accomplished according to the invention by the fact that the cross-section through which pass the ion rays issuing from the ion emitting source is projected by means of an electrostatic multiple lens on the foil to be perforated. To this end, a short focus multiple lens is preferably employed in front of the foil. By providing the electrostatic multiple lens with a plurality of accurately aligned perforations, it is also possible to burn when producing filters a corresponding plurality of perforations in the foil. In carrying the invention into practice a multiple lens is preferably employed consisting of two electrodes impressed with a high negative potential and provided with a plurality of perforations and of an electrode interposed between these two electrodes and impressed with a lower negative potential and also provided with perforations.

Since the distance between the individual elements of the multiple lens is relatively great, perforations are obtained in the foil during the burning operation between which there may be relatively broad stripes of the foil which are not perforated. In order to provide also these stripes with perforations to the greatest possible extent, the arrangement according to the invention is so designed that the ion rays may be deflected after the first burning operation by means of deflecting magnetic fields in a corresponding manner.

A further possibility of increasing the number of perforations obtainable with one burning operation consists according to the invention in the fact that the ion emitting source is provided in a known manner with two electrodes having a plurality of perforations which form a plurality of cross-sections for the passage of electron rays. By means of the multiple lens not only a single ion ray cross-section but a plurality of ion ray cross-sections are therefore projected simultaneously.

In the accompanying drawings, Fig. 1, is shown an embodiment of the invention in diagrammatic form. 1 denotes a canal ray tube in which is arranged an oxide-coated incandescent cathode **2**. Directly in front of the incandescent cathode are disposed two series-arranged electrodes **3** and **4**. These electrodes are each provided with a plurality of accurately aligned perforations **5** and **6** respectively. These electrodes are spaced from each other a distance of about 3 mm. The electrode **3** may, for instance, be impressed with a voltage of —40 Volts and the electrode **4** with a voltage of —20,000 Volts. Hydrogen of 10^{-2} vacuum is, for instance, supplied to the tube. The arc gas discharge resulting therefrom may, for instance, burn at a potential of 40 Volts. In this known arrangement an ion emitting source is provided by means of which a plurality of fine ion rays corresponding to the number of perforations **5** and **6** is produced. The ion rays leave the ion emitting source at a very uniform electron speed under a sufficiently large angle. **7**, **8**, **9** denote an electrostatic short focus multiple lens which serves to project the numerous cross-sections for the passage of the ion rays on a foil **14** arranged directly behind the multiple lens. To this end, the foil **14** is stretched on a carrier **13**. The three electrodes of the multiple lens are each provided with a plurality of perforations **10**, **11** and **12**. In this manner a number of elements of the multiple lens are obtained corresponding to the number of the perforations. The central electrode **7** is, for instance, impressed with a potential of —5,000 volts, whereas the other two electrodes **8** and **9** with a potential of —20,000 volts.

In Fig. 2 is shown a top view of a portion of the foil film **14** provided with perforations obtained by the burning process. **17**, **18**, **19** and **20** denote fields of filter perforations, each produced by one element of the multiple lens. A perforation in such a field corresponds to the projection of each perforation in the electrodes **3** and **4** of the electron emitting source. Since from a constructional point of view the distance *a* between the individual fields of the perforations produced by each element of the multiple lens is great in proportion to the width *b* of the field, also the portions of the foil not yet provided with perforations may be perforated by the use of electromagnetic deflecting fields which may be, for instance, produced by deflecting plates **15** and **16** which deflect the ion rays in a corresponding manner. With the aid of the above-described arrangement the greatest possible number of fine, nay ultra-microscopic filter perforations may be attained. Assuming, for instance, that in the electrode **4** there are one hundred perforations of a diameter of 0.5 mm. and that the electrostatic multiple lens has 50 perforations, 5,000 perforations are obtained at the same time in the filter foil with one burning operation.

When carrying the invention into practice it is particularly advantageous to use such ions which react with the filter substance. This is, for instance, the case when employing oxygen and pyroxylin foils.

MANFRED von ARDENNE.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

M. VON ARDENNE

ARRANGEMENT FOR PRODUCING FILTERS

Filed March 24, 1941

Serial No.

385,034

Fig. 1

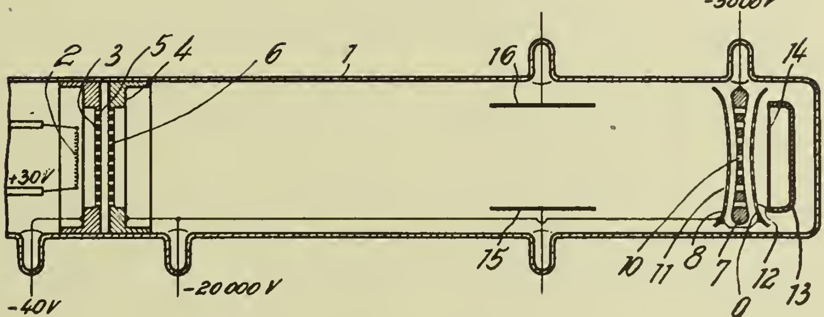
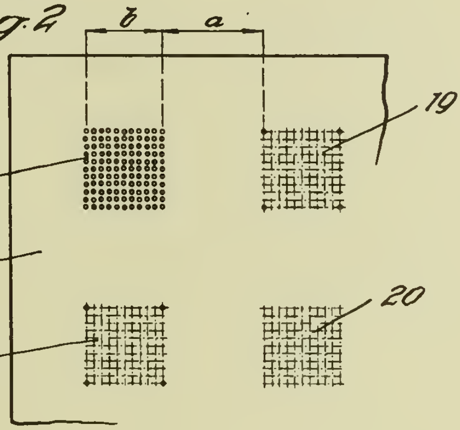


Fig. 2



Inventor:
Manfred von Ardenne
By Richardson and Geier Att'ys

Published May 11, 1943 Serial No. 385,561

ALIEN PROPERTY CUSTODIAN

ELECTRIC CELLS

József Szabó, Szombathely, Hungary; vested in the Alien Property Custodian

Application filed March 27, 1941

This invention relates to means for generating electric energy, more particularly to electric cells of any kind, such as primary or secondary galvanic elements or batteries.

The object of the invention is to improve the known electric cells in such a manner that their polarization should be lowered as far as possible and that the cell shall supply a current of constant voltage and shall have a capacity higher than that of the known electric cells.

It is a well known fact that most of the usual electric cells are polarized after a certain period of use and that consequently their capacity is gradually lowered. The capacity of certain of the known cells is relatively low in itself and is further reduced by polarization. Other types of known cells generate dangerous, unpleasant and unhealthy gases while in action.

Efforts have been made to avoid these drawbacks by using depolarizing means of different kinds, or by altering the construction of the cells or the composition of the materials forming their electrodes and electrolyte. In many cases such suggestions failed to attain the desired effect. For the most part, they rather retarded the chemical processes and this had an unfavorable influence upon the capacity of the cell. Other suggestions, succeeding on obtaining the desired effect, had, however, no practical value, making use of circumstantial or expensive means.

The object of the present invention is to eliminate completely the drawbacks of the known electric cells.

It is known in the art that certain substances are capable to create chemical processes by their presence per se or by using up themselves. On suitable conditions even gases are capable of producing effects which finally are adapted to stop the polarization, to transform or to bind the products causing polarization or to eliminate the formation of injurious gases. The above mentioned gases may have the effect of only assisting the oxidising or reducing chemical processes produced by various depolarising means or agents used in basic or acidic media. The gases, if introduced in a suitable manner into the cell, may catalyze the electrodes or auxiliary bodies arranged around them, they may enter temporarily into the electrodes or auxiliary bodies, being afterwards interchanged with other gaseous substances, they may produce or modify chemical processes or use themselves up.

According to the present invention, the introduction of gases or mixtures of gases corresponding to the nature of the electric cell in question is effected in such a manner that the gases or mixtures of gases are previously absorbed or occluded by the material of the electrodes or auxiliary bodies having the purpose of enlarging the surface of the electrodes and being arranged in contact with or separately from the electrodes side by side or around them. For the purpose of the invention, both as electrodes and as auxiliary bodies, various kinds of carbon, such as retort carbon, charcoal, coke, graphite may be advantageously used. The various kinds of carbon have the further advantage of being inexpensive. The carbon may be used in the form of compressed, compact bodies or of powder or granules. For the absorption of gases other materials of large surface, e. g. finely granulated metals are also adapted.

By using as electrodes the above mentioned substances having in advance absorbed or occluded gases or mixtures of gases or introducing them as auxiliary bodies into the electrolyte, electric cells are produced, which, in comparison to the known electric cells, have an increased and constant voltage, independently from the duration of the load. These cells have further smaller volume and weight than the known ones, in addition to an increased efficiency and a simple construction.

The drawing shows a preferred form of the electric cell according to the invention.

The jar **1** of the cell is closed by a cover **2**. The positive carbon electrode is formed by a compressed carbon bar **3** containing occluded or absorbed oxygen, whereas the negative electrode is constituted by an amalgamated zinc cylinder **4**. The zinc cylinder is fastened to a bracket **5**, having two or more connecting bolts **6**, which penetrate the cover **2** and are suspended by heads **7** respectively a nut **8**. The nut **8** constitutes one of the terminals, while a metallic cap **9** secured to the carbon bar **3** constitutes the other one. The electrodes are immersed into the electrolyte **10**. The compressed carbon bar **3** is surrounded by a body **11** formed by coke granules containing similarly absorbed oxygen. The coke granules are squeezed into a shell, permeable for gases and fluids, e. g. into a perforated cylinder **12**, which is closed on both of its ends e. g. by plugs **13** of pitch or the like. The cylinder **12** may be made of any acid- and alkali-proof material, e. g. artificial masses, ebonite, an organdy bag suitably impregnated etc. As electrolyte diluted sulphuric acid may be used in combination with chlorates or bichromates dissolved in it. With such an electric cell I obtain a perfect depolarization, by

which no free gases are developed. Beside bad conducting zinc sulphate, well conducting, easily soluble chlorides or chromates are formed, so that the internal resistance will not be increased.

Experiments have shown that an element of the above kind, having a positive electrode resp. an auxiliary body of carbon e. g. coke granules, prepared according to the present invention and weighing about 300 g., the volume of its electrolyte being 1.9 liter and having a zinc electrode weighing about 202 g. equal to 1.34 g. or in the case of pure zinc, 1.22 g. per ampere-hours, produces an output of 150 ampere-hours of current. As electrolyte, sulphuric acid of 1.12 specific gravity has been used containing 80 g. potassium chlorate, $KClO_3$, per liter. Such an electrolyte may be utilized up to at least 80% of its theoretical capacity. The open voltage of the cell is 1.65 volt which, under a load of 300 milliamperes, falls to 1.33 volt (the cell may also be loaded up to two amperes). Beginning from this point, the voltage remains constant until the end of the capacity of the cell, falling only near to the end of this period in a quite unimportant measure, by 0.04–0.05 volt. Finally, the voltage falls suddenly. The cell may be loaded continually. It may be appreciated that by preparing the carbon in a more perfect manner, the weight of the carbon, and by using a more concentrated electrolyte, the quantity of the electrolyte and in consequence thereof the volume of the cell may be substantially reduced, but, even upon taking into consideration the above data, the volume of the known sal-ammoniacal batteries at equal capacity is larger by 20–25%, their voltage at constant load is lower by 0.25 volt and they can only be loaded with 50 milliamperes. The jar of the cell must not be measured to contain the whole quantity of electrolyte (1.9 liter in the above example) necessary for the whole capacity (150 ampere-hours in the above example), but it may have a smaller volume as well. In this case, the electrolyte must be exchanged after being exhausted.

The above data and explanations have only the object of illustrating the invention without restricting its scope to them. The dimensions of the electric cell according to the invention depend firstly on the desired efficiency, further on the quality, on the density, on the shape (compact or granules) of the carbon and on the composition of the electrolyte.

Instead of oxygen as absorbed or occluded gases other gases, such as nitrogen, hydrogene, ammonia, carbon monoxyd and the like, or a mixture of two or more of these gases according to the requirements set by the chemical process to be attained, may be used.

Such carbons or other materials containing occluded gases, supply a continuous and strong current not only in combination with diluted sulphuric acid and potassium chlorate or sodium chlorate, resp. with potassium bichromate or sodium bichromate, that is to say with compounds rich in oxygen, but also in combination with other chemical substances, such as e. g. diluted hydrochloric acid with sodium sulphate, or a solution of common salt with the addition of ammonium sulphate. In the last named combinations unprepared carbon as ordinarily used generates no current at all.

In the above description by electric cells generally galvanic batteries, dry cells and accumulators are to be understood.

JÓZSEF SZABÓ.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

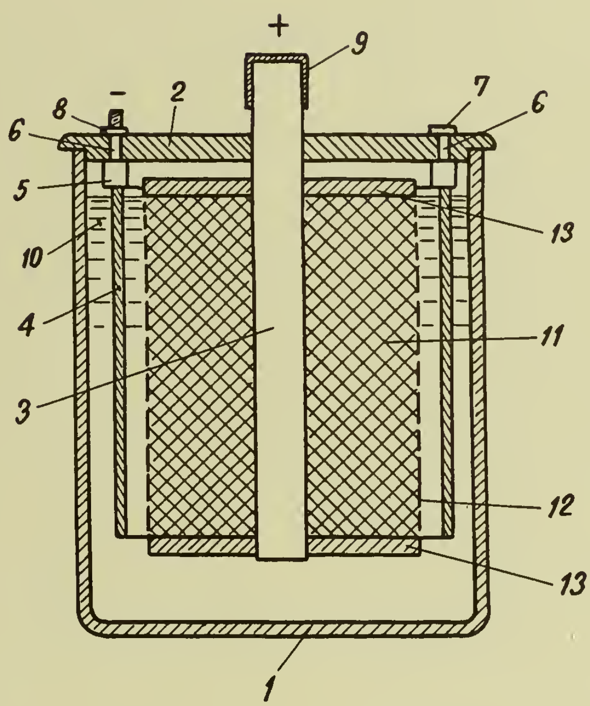
J. SZABO

ELECTRIC CELLS

Filed March 27, 1941

Serial No.

385,561



Inventor,
V. S. József

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943

Serial No. 386,560

ALIEN PROPERTY CUSTODIAN

SMOKE PRODUCING MEANS

Célestin Léon Herbline, Paris, France; vested in the Alien Property Custodian

Application filed April 2, 1941

This invention relates to smoke-producing means and more particularly to such means which are adapted for producing artificial clouds of smoke.

The chief object of the invention is to improve smoke-producing devices in order to insure the production of smoke in a continuous manner during the time desired by the operator.

Another object of the invention is to improve the said devices in order to enable them to produce smokes having a predetermined coloration which can be modified by the operator according to his own desire during the operation.

The above mentioned objects are attained through the characteristical features resulting from the description as given hereunder.

Devices according to the invention are shown by way of examples in both appended drawings, in which:

Figure 1 is an axial vertical sectional view showing a device made according to the invention.

Figure 2 is a front elevation of this device.

Figures 3 and 4 are vertical sectional views of other devices made according to the invention.

Figure 5 is a front view of an aircraft provided with a device made according to the invention.

Figure 6 is a side elevational view of this aircraft.

Figure 7 is a diagrammatical view of a submarine boat provided with a device made according to the invention.

Figure 8 is a detail view showing the device mounted in the submarine of Figure 7.

The device shown in Figures 1 and 2 comprises a vessel **1** forming a magazine closed in its upper part by a removable cover **15** and terminated in its lower part by a master nozzle **16**.

The inner chamber **17** of the vessel **1** is divided into two elementary chambers 17^1—17^2 by a trap **18** pivotally secured at **19** to the vessel **1** and urged by a return spring **20** operating as a compression spring.

A tube **21** with a cover **22** is located on the side of the vessel **1** and terminated by an auxiliary nozzle **23** opening into the axis of the master nozzle **16**.

The operation of this device is as follows:

A first roll 5^1 of combustible material, formed for example of old moving picture films, is introduced into the vessel **1** after removing the cover **15**, whereafter the said roll 5^1 is set on fire, thus producing a jet of smoke which is ejected along f^1 through the master nozzle **16**.

When the combustion of the roll 5^1 has gone sufficiently far, a second roll 5^2 is introduced into the chamber 17^1 of the vessel **1** on the trap **18**. This trap swings along f^2 about its link **19** while compressing its spring **20**, thus allowing the roll 5^2 to fall from the charging chamber 17^1 into the combustion chamber 17^2; the said roll 5^2 is then set on fire by itself and further ejects smokes through the master nozzle **16**.

During the combustion of the roll 5^2 a third roll 5^3 is introduced into the charging chamber 17^1 and so on; thus a continuous ejection of smoke along f^1 through the master nozzle **16** is obtained; during the whole operation the trap **18** separates the charging chamber 17^1 from the combustion chamber 17^2, thus avoiding the flowing back of the smoke into the charging chamber 17^1 and into the upper opening of the vessel **1**.

During the combustion of the rolls 5^1—5^2 etc. and the ejection of their white smoke, balls **25** of materials producing various colours may advantageously be introduced into the tube **21** after removing the cover **22**, the said balls falling into the same tube **22** and producing a coloured smoke which is brought by the nozzle **23** into the axis of the nozzle **16**.

According to the invention a device is thus obtained which offers the two following advantages:

(*a*) a continuous production of artificial smoke;

(*b*) an operation which is very easily adaptable since the operator may especially cause the production of artificial smoke to last as long as he desires by further introducing rolls 5^1—5^2 into the vessel **1**.

Furthermore the operator can introduce products **25** of various colorations into the tube **21**, thus producing smoke jets of various colours at his own desire, so that he is especially able to give any desired signal.

Various modifications may be brought to the above described device, which is given merely by way of example; it is more particularly possible (see Figure 3) to provide a plurality of vessels 1^1 1^2 forming magazines and mounted side by side; each of these magazines is formed in the same manner as shown in Figures 1 and 2 (cover 15^1—15^2, master nozzles 16^1—16^2, trap 18^1—19^1—19^2).

The rolls 5^1—5^2 . . . are successively introduced into the vessels 1^1—1^2 forming magazines, so that the combustions in the magazines are out of phase with another, the combustion in one magazine being almost finished while the combustion in the other magazine begins. Thus the ejection of continuous smoke clouds is obtained.

The tube **21** for the introduction of balls **25** of

materials producing coloured smokes is arranged in the inner part, in the middle of the magazines 1¹—1² etc.

Thus a unit is obtained which works in similar conditions as the device shown in Figures 1 and 2 and permits to obtain along f^3 a jet of artificial smoke in which smoke coloured at the own desire of the operator are mixed along f^4.

Figure 4 shows an embodiment of the devices according to Figure 3; each magazine 1^1 1^2 etc. carries itself and along its axis a tube 21^1—21^2 etc. for the introdutcion of balls **25** producing coloured smoke; thus it is possible to obtain along f^3 a complex cloud of smoke formed of veins of elementary smake jets of various colorations; it is possible to form a cloud composed of three smoke jets arranged close to another: blue, white, red; it is also possible to form all the ranges of coloured and combinations of colours as desired, corresponding to a signal code established in advance.

The device made according to the present invention can be mounted either stationary or on any vehicle; it is possible, for instance, to mount devices of this kind on an aircraft or on a man of war.

Figures 5 and 6 show an aircraft provided with a device arranged for producing artificial clouds of smoke according to the present invention.

This device comprises the magazine vessel **1** and the master nozzle **16** as described and shown in Figures 1 and 2, the said nozzle producing the artificial clouds of smoke along f^1.

The whole device is so mounted that it can slide in the body of the aircraft along the arrow f^6, so that it is possible to retract the device into the inner part of the said body for normal flying or, on the contrary, to cause this device to project out of the body for its operation for producing smoke.

Figures 7 and 8 show a submarine boat **8** provided with a magazine vessel **1** which receives the roll 5^1 of combustible material in its lower part and which is provided with a side branch **26** having a closing trap **18** which retains the following roll 5^2; it is thus possible to obtain a continuous ejection of smoke as already described with reference to Figure 1; the roll 5^1 burns and produces smoke jets which are ejected through the nozzle **16**; during this time the roll 5^2 is introduced into the branch 5^6 so that it takes then the place of the roll 5^1 at the end of the combustion.

The tube **21** for the production of coloured smoke is bent in its lower part and terminates outwardly in the form of a funnel **27** which receives the balls **25** of materials producing coloured smoke.

The master nozzle **16** and the auxiliary nozzle **23** are closed by a cover **28** which insures a tight joint.

The whole device which is thus formed is mounted in the hull of the submarine so that it can slide vertically in Figure 6 and in the reverse direction, so that it is possible either to bring the whole device above sea-level and to produce the artificial smoke there or, on the contrary, to retract this device into the hull of the submarine when the production of smoke is no longer wanted.

CÉLESTIN LÉON HERBLINE.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

C. L. HERBLINE
SMOKE PRODUCING MEANS
Filed April 2, 1941

Serial No.
386,560
2 Sheets-Sheet 1

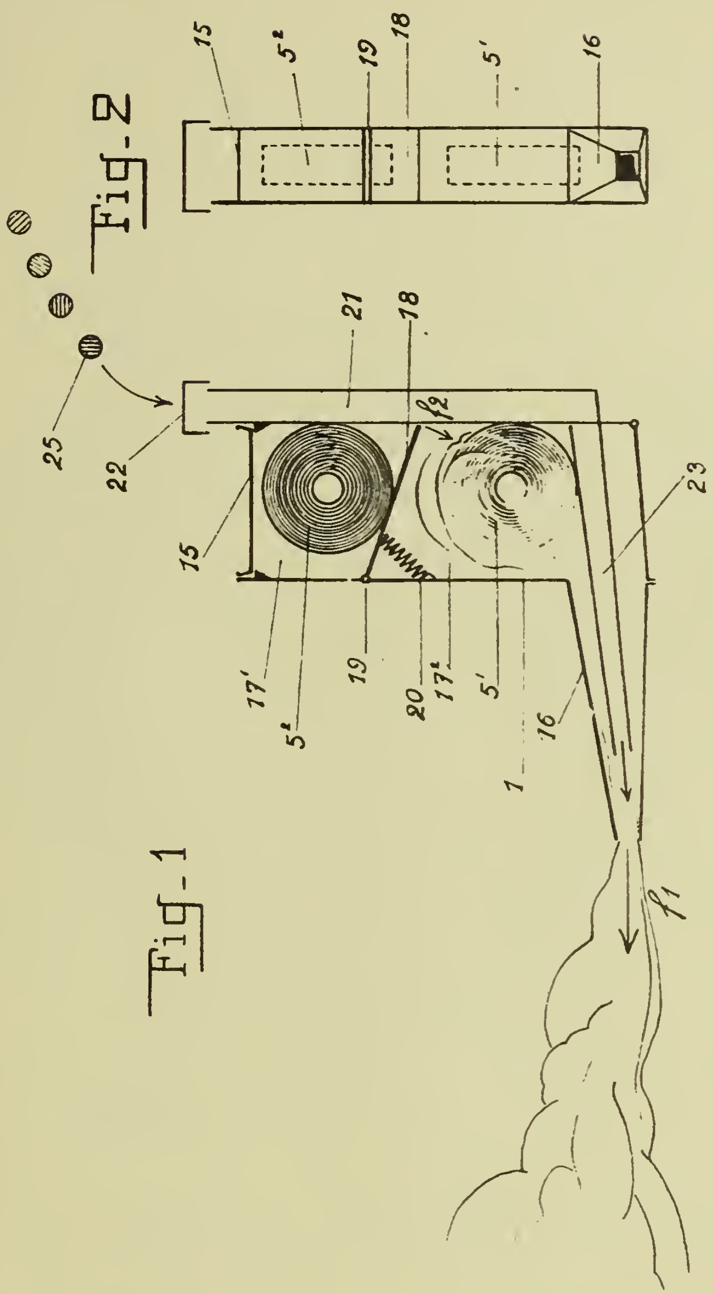


Fig-2

Fig-1

INVENTOR:
Célestin L. Herbline,
By: Watson Cole Grindle & Watson
Attorneys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

C. L. HERBLINE
SMOKE PRODUCING MEANS
Filed April 2, 1941

Serial No.
386,560
2 Sheets-Sheet 2

Fig_3

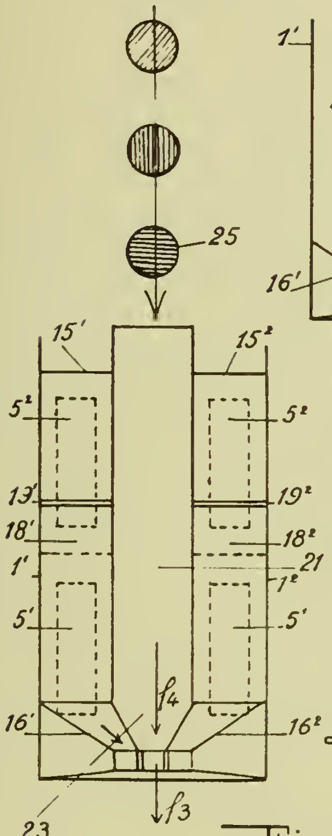


Fig_4

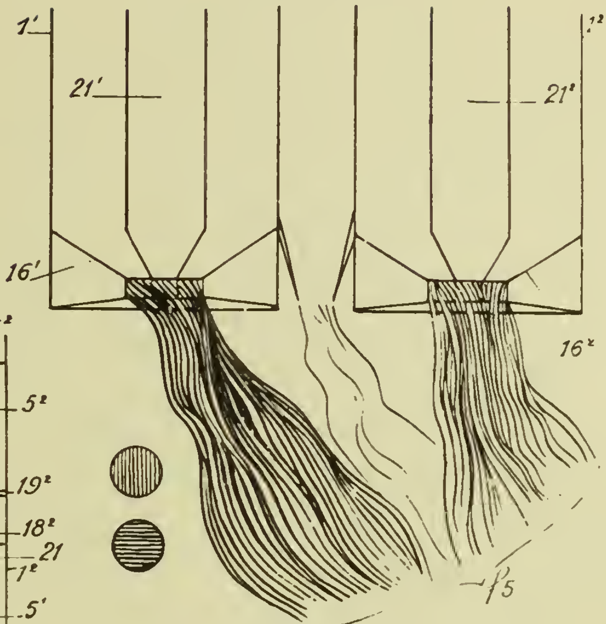


Fig_5

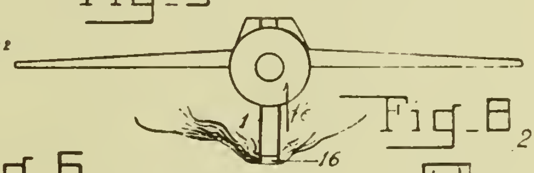


Fig_6

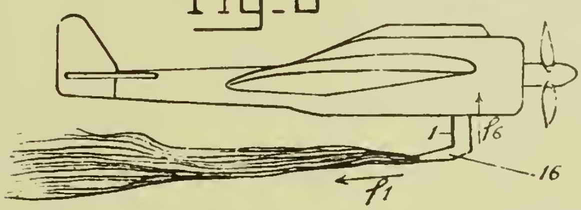


Fig_7

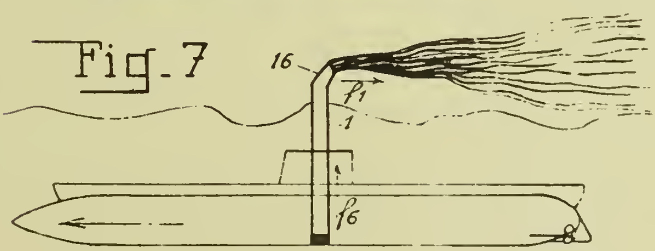
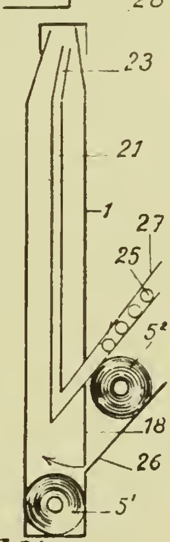


Fig_8



INVENTOR:
Célestin L. Herbline,
By: Wallenstein & Groff Attorneys.

Published May 11, 1943

Serial No. 387,359

ALIEN PROPERTY CUSTODIAN

METHOD FOR THE PRODUCTION OF CERAMIC GOODS

Emil Klingler, Korntal, Germany; vested in the Alien Property Custodian

No Drawing. Application filed April 7, 1941

Ceramic goods containing fluxing or binding materials with preponderant content of alumina are known as also goods without addition of real fluxing or binding material. It is known that the products of the first mentioned kind are preferably produced by known pressing methods. In opposition hereto the ceramic goods of the last mentioned kind are produced almost only by casting. It is further known, that the production of ceramic goods from pure alumina by casting is relatively expensive or at least more expensive than the production of pressed products containing sintering means. Notwithstanding, cast ceramic goods free from fluxing or binding materials have been adopted in the technics for the reason that the properties of the pure alumina, for instance the heat conducting capability of the same, the capability of electric insulation and so forth are found in highest perfection in such products and in many instances differ only little from the values obtainable solely by the alumina. In opposition hereto, these so-called alumina properties are toned down more or less by the addition of the fluxing material according to the kind and/or the quantity of the fluxing or binding material employed, also if in these products the alumina forms the preponderant constituent.

It has been further ascertained that stones for sparking plugs cast for instance from pure alumina supply, as regards stability against change of temperature, not only not better but even worse values than insulators which contain fluxing or binding material and consist for instance of 95% alumina and 5% magnesium metasilicate. This result, which at first seems to be surprising, could be explained in the course of further experiments almost with certainty in so far as the reduced stability against change of temperature of the stones cast from pure alumina, compared with the stability of the sparking plug stones containing fluxing or binding material, seems to be in any connection with the numerous fine fissures, so-called hair fissures, having been observed in the structure. Whether the fissures in the comparison pieces are due more or less to the extraordinarily high burning temperatures and/or to the almost completely lacking of the fluxing material and/or to the special method of production and the like could not be explained with security in the frame of the experiments carried out up to the present.

The present invention relates to a method for manufacturing by pressing ceramic goods the content of alumina of which amounts, after the ceramic burning, to more than 98% and their percentage of fluxing material is below 1%. The content remaining for the 100% is to be divided to the impurities existing in the alumina from the beginning and having probably been added in the course of manufacture.

According to the invention the unshaped bodies necessary for the production of the ceramic goods with such a high content in alumina are obtained by a dry pressing of the alumina. It is known, that pure alumina cannot be pressed in dry state. In order therefore to be able to carry out the dry pressing with pure alumina for the purpose of the production of unshaped bodies according to the invention, the pure alumina must first be transformed into a state adapted to be pressed in dry condition. This can be attained according to the invention in the following manner:

Pure alumina with a content of 99.4 to 99.7% Al_2O_3 is finely ground in dry state. Rubbered mills with grinding balls of pure corundum are preferably employed herefor. The alumina flour thus obtained is then treated with diluted acid. the employed quantity of which depends on its kind. It is for instance advisable, to employ, when hydrochloric acid is used, for 100 kgs alumina flour 7.7 liters diluted hydrochloric acid. Instead of hydrochloric acid also any other inorganic or organic acid suitable for the purpose may be used, but according to the results obtained up to the present the hydrochloric acid supplies the best values. The hydrochloric acid is especially advantageous also as regards economy.

It is known that the alumina is decomposed or activated by the added acid. In which measure this takes place depends as well on the concentration of the acid which is employed and on its electrolytic dissociation degree as on the fineness of the alumina flour. Of decisive importance for the activation of the alumina is, however, chiefly the time during which the acid acts upon the alumina. The transformation of the alumina, practically insoluble in water and diluted acids, into a more or less strong colloidal, which means not genuine solution—in the present instance by way of aluminium chloride to the aluminium oxidehydrate—is a timely reaction which gradually occurs only after the acid has acted for days onto the alumina flour.

On the activation of the alumina, already known as such, follows, according to the invention, immediately the hydrolysis of the alumina by strong dilution of the slime, for instance in the proportion 1:2. The colloidal, diluted solution is then evaporated preferably at a timely distance, according to the invention, until the condensed residue can be pulverised easily. The pulverized alumina is then well pressable in dry state without further addition of plastic substances or of substances which become plastic at the pressing. From the unshaped bodies pressed at dry state the shaped bodies ready for burning are then produced, if necessary by separate treatment, and then burnt at temperatures of about 1800° C.

There has been ascertained, however, that at the re-crystallisation of the alumina, which according to the invention is pressable in dry state during the ceramic burning—the re-crystallisation proceeding seems to be initiated also with this pure alumina same as with cast bodies, according to the ascertained facts, by little impurities for instance of iron compounds—some of the crystals grow excessively on the cost of others. As hereby the properties of the burnt body are unfavorably influenced, it is not only advisable, but even necessary, to use a sintering agent for the more rapid sintering of the alumina adapted to be pressed at dry state. Such sintering agents are known. For the alumina pressable at dry state iron chloride has proved to be especially suitable as sintering agent, which suitably is added to the alumina with the hydrochloric acid, or is formed by treatment with hydrochloric acid of the alumina containing some metallic iron. It is not excluded that the iron chloride at the simultaneous addition of the acid also assists catalytically the activating of the alumina, but it participates with certainty in the hydrolysis proceeding of the alumina. Hereby a very fine and chiefly also uniform distribution of the sintering agent in the alumina pressable at dry state is positively attained. The extremely fine distribution of the sintering agent has an advantageous effect at the ceramic burning with relation to a more uniform re-crystallisation of the alumina.

The ceramic goods produced according to the invention with addition of iron chloride as sintering agent consist after the ceramic burning of crystallized alumina with little additions of iron compounds (below 1%). The iron compounds convert, as a rule, with the usual impurities of the alumina mostly to iron aluminium silicates. The by far greatest portion of the iron chloride used as sintering agent is, however, sublimated off or evaporated during the ceramic burning.

The alumina pressable at dry state sintered with the little fluxing material percentage supplies products, which very advantageously differ from the ceramic goods produced of pure cast alumina, although they correspond in their composition in general to these, as also from the ceramic goods containing more binding material with preponderant basis of alumina. This is valid especially for the stability against sudden change of temperature.

The sintering agents employed up to the present in the ceramics were always materially different from the portion of the ceramic goods, which had to be sintered. It has further been found, that the alumina pressable at dry state and produced according to the invention can be further improved by an additional material of similar material composition as it has itself. Crystallised corundum, i. e. molten alumina with 99.5 to 99.7% Al_2O_3 content is a sintering agent materially similar to alumina pressable at dry state. Herefor it is however necessary that the crystallised corundum is added in finest ground state to the alumina pressable at dry state according to the invention and also preferably intimately admixed with the same. This is preferably effected by stirring the corundum flour into the condensed alumina residues and in the presence of little quantities of iron compounds. The corundum, however, can also be added to the already pulverised residue. The quantity of the sintering agent of similar kind added to the alumina which according to the invention is pressable at dry state may amount up to 50 weight percent.

The most finely ground corundum, if employed according to the invention, acts at the ceramic burning of the shaped bodies as crystallisation agent in the alumina pressable at dry state produced according to the invention and most intimately mixed with the corundum flour as sintering material. By the fineness of the ground corundum many crystallisation germs are thus produced within the ceramic mass. This is favorable, as by the great number of crystallisation germs an essentially more rapid re-crystallisation of the alumina pressable at dry state is attained and chiefly an irregular growing of indidividual crystals on the expense of others is prevented. Beyond this, the corundum crystals as such exert already a considerable solidifying effect upon the structure of the burnt ceramic goods. It has further been found, that the pressing capability of the alumina pressable at dry state is not only not impaired by the addition of the most finely ground corundum but on the contrary quite considerably improved, as also besides this the working facility of the condensed alumina is additionally quite considerably facilitated.

The addition of the finest ground corundum with simultaneous presence of small quantities of $FeCl_3$ has, however, also the unexpected advantage, that the burning time of the shaped bodies can be shortened, under circumstances even with slight lowering of the maximum burning temperature.

The ceramic goods produced according to the invention from pure alumina pressable at dry state, with or without employment of finest ground corundum as sintering agent, are free from fissures in their structure according to the observations which have been made. These goods have also in the highest degree the properties of the pure alumina, such as their good heat conductability, their electric isolation capability and so forth. They show, however, chiefly a maximum stability against change of temperature, especially a maximum stability against sudden change of temperature. Such ceramic masses which can be pressed as according to the invention are especially suitable for the production of such ceramic articles, the use of which supposes a high stability at temperature change, as is the case for instance in insulators for sparking plugs.

By the method according to the invention it is now also possible to dry-press pure alumina without addition of plastic substances or of substances which become plastic at the pressing. By the method according to the invention ceramic goods can be produced as far as necessary practically without a percentage of iron compounds, as far at least as the unavoidable polluting of the pure alumina by iron compounds is left out of consideration the relative proportion of which even can be easily increased by the technical method. But even these small quantities of iron compounds are considerably reduced at the ceramic burning by evaporation or sublimation. The lower the iron constituent is in the burnt body, the greater will be the electric insulation capability of the same. It has been ascertained that this insulation capability in goods produced according to the invention from alumina made pressable in dry state with employment of finest ground corundum as sintering agent exceeds, as regards number, all known values of goods of similar composition produced otherwise.

EMIL KLINGLER.

Published May 11, 1943 Serial No. 388,680

ALIEN PROPERTY CUSTODIAN

CHANGE-PROPELLING-PENCIL

Georg Meier, Nuremberg, Germany; vested in the Alien Property Custodian

Application filed April 15, 1941

The invention refers to a change propelling pencil with which the refills are brought into writing position by a pushing movement in the longitudinal direction of the pencil, the feeding member being adjustable by turning to the single refill carriers guided in a refill carrying sleeve known to the art.

With pushing-change-pencils known to the art every refill carrier possesses an operating member protruding through a slit of the case sleeve. The disadvantages of such pencils lie in the fact that the members protruding from the surface of the case are liable to damage the garments, particularly the pockets, and interfere with the position of the pencil in the hand when pushing, that for every refill carrier a guiding slit must be provided for with stops securing the end position, that dust, moistness and the like are apt to enter through these slits, and that for the feed of the different refill carriers a particular member has to be operated in every case. It is true, with other known pushing-change-pencils the operating members protruding outward are avoided. They possess a feeding member adjustable by turning to the single refill carriers. But these pencils too are deficient. With these pencils the refill carrier lying in writing position has to be returned to its original position by hand by displacing it lengthways, when the refill is to be changed, before one is able to change over and place a new refill carrier into writing position. The longitudinal displacement of the refill carriers and turning the feeding member for transferring it to another refill carrier are in no connection with one another. Thus everyone of the movements mentioned requires a special operation.

These deficiencies are eliminated by the invention by everyone of the refill carriers brought into writing position by the feeding member being held in this position by a turnable stop and being subject to the action of a spring which guides it back automatically to the position of rest when the stop is turned, said stop being arranged at a carrying part which is connected with the carrier receiving the feeding member and which is thus adapted to be turned along with the carrier. All the refill carriers are subjected to the action of one single spring surrounding the sleeve of the refill carriers and bringing back automatically the refill carrier which is at the time in writing position and which is released on turning the stop, to the position of rest.

A further feature of the invention consists in the carrier of the feeding member being propped against the carrying part of the stop by a spring and thus likewise returning automatically to its original position.

In preference the construction is such that the feeding member formed as a lengthening piece, projection, nose or the like is arranged at the displaceable rear part of the two-piece case sleeve and that this part is connected with the front part of the case sleeve by a gudgeon which on being turned carries along the carrying part of the stop and which is displaceable within it. The carrying part rests indisplaceable, but turnable in the sleeve of the refill carrier supported by the front part of the case sleeve.

With a pushing-change-pencil formed according to the invention the manipulation is facilitated considerably. When the rear part of the case sleeve and consequently the feeding member too is turned, the refill carrier being in writing position is released and guided back automatically to the position of rest. As simultaneously the adjustment to the next refill carrier takes place, the process of changing over is not only simplified, it may also be carried through very quickly. The latter also for the reason that the carrier receiving the feeding member returns likewise to the original position automatically when the respective refill carrier is brought into writing position. If the rear part of the case sleeve serves as a carrier for the feeding member, it entails the further advantage of the pencil always showing the same length both when in use and when not in use.

In the drawing the invention is illustrated by way of example,

Figure 1 showing a longitudinal section through a pencil when not in use,

Figure 2 a section on II—II of Figure 1,

Figure 3 a section on III—III of Figure 1,

Figure 4 a section on IV—IV of Figure 1,

Figure 5 a longitudinal section on feeding a refill carrier,

Figure 6 a longitudinal section of the pencil ready for use,

Figure 7 a cross section of another form of execution.

The case sleeve of the change-propelling-pencil consists of the front part **1** and the rear part **2** which is displaceable in relation to part **1**. A strengthening **3** of the front part **1** of the case sleeve serves as a guidance on displacement and receives colour-indicators **4** visible through a window **5** of part **2** of the case sleeve.

In part **1** of the case sleeve the sleeve **6** of the refill carrier is supported in the guidances of

which the refill carriers 7 are displaceable. With the example of execution drawn four refill carriers are provided.

On longitudinal displacement the refill carriers 7 are guided by means of a nose or the like 8 in longitudinal slits 9 of the sleeve of the refill carrier. At their rear end on which the feeding member acts, they are inpreference bent so as to form a pass piece 10. They are subjected to the action of a spring 11 propped against the strengthening piece 3 and which may be so narrow as to hold the refill carriers in the guidances of the sleeve of the refill carriers. In this case the stop 19 described further down need not be resilient.

In the interior of the sleeve 6 of the refill carrier a tube 12 is arranged unable to be displaced and conducted into ring 13. In tube 12 a gudgeon 14 is displaceable which on being turned carries along the disc 15 pressed into the tube 12, thus also tube 12. For this purpose the gudgeon is formed square in preference. It is housed in the closing cap 16 and is connected thereby with part 2 of the case sleeve.

Part 2 of the case sleeve receives the feeding member 17 which is formed as a lengthening piece, projection, nose or the like. A spring 18 tends to hold part 2 of the case sleeve in the original position.

At the tube 12 incapable of being displaced, but capable of being turned there is arranged a stop 19 which holds the respective refill carrier in writing position. It consists in preference of a resilient arm inclined forwards over which nose 8 of the refill carrier catches and which in this manner prevents the respective refill carrier from any pushing back not desired.

In front tube 12 is guided in the sleeve 6 of the refill carrier by means of a ring 20. It receives in its interior at front a disc 21 which is engaged by a square gudgeon 22, the head 23 of which has an elevation e. g. a cam 24 which catches under action of spring 27 into notches, holes or the like 25 of a disc 26 arranged in front at the sleeve 6 of the refill carrier.

When the parts of the new change-propelling-pencil are in the position shown in Figure 1, when not in use, and when the refill carrier adjusted—the colour of its refill may be seen through the window aperture 5—is to be brought into writing position, part 2 of the case sleeve and thus the feeding member 17 is pushed forward. In doing so, the refill carrier adjusted is guided forward according to Figure 5, until its nose 8 catches over the resilient stop 19. The refill carrier is in writing position. The part 2 of the case sleeve is guided back automatically to the original position by spring 18 (see Figure 6).

Now, when a refill of some other colour is wanted for writing, the part 2 of the case sleeve is turned until the color-indicator desired becomes visible through the window 5. At the same time the feeding member 17 is adjusted to the respective refill carrier. By the act of turning tube 12 and thus stop 19 is carried along. As soon as the latter has passed nose 8 of the refill carrier being in writing position, the latter jumps back into its position of rest under action of spring 11 without any particular manipulation being required for it. The refill carrier adjusted now can be guided into the writing position in the manner described above.

The notch arrangement 22, 23, 24, 25, 26, 27 secures an exact adjustment of the feeding member 17 and of stop 19 to the respective refill carrier and prevents any not desired turning during writing.

Instead of notch arrangement 22—27 and a stop 19 separated from it an arrangement according to Figure 7 may be used with which one single member secures the adjustment and holds the refill carrier being in writing position. In this case the stop according to Figure 7 is formed as a resilient member 28. A curvature 29 of this member arranged at the end lays itself in the manner of a notch between two guidances of sleeve 6 of the refill carrier and thus takes over the function of the notch arrangement 22—27 described above. The end part 30 of the member 28 takes over the function of stop 19 described above. This form of execution has the advantage of simplifying the manufacture and thus reducing its cost. But in this case the turning can only be effected in one direction when changing over, contrary to the example of execution according to Figures 1–6.

GEORG MEIER.

PUBLISHED	**G. MEIER**	**Serial No.**
MAY 11, 1943.	CHANGE-PROPELLING PENCIL	**388,680**
BY A. P. C.	Filed April 15, 1941	2 Sheets-Sheet 1

Fig. 5

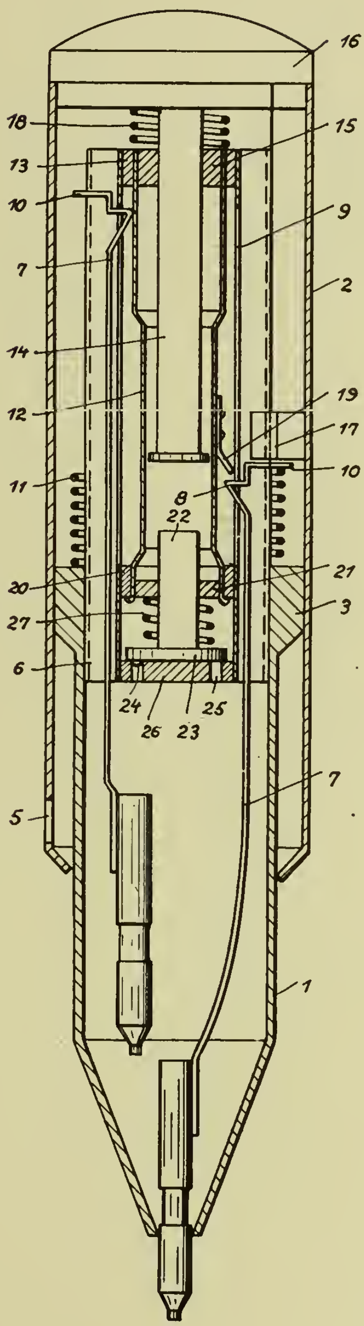


Fig. 6

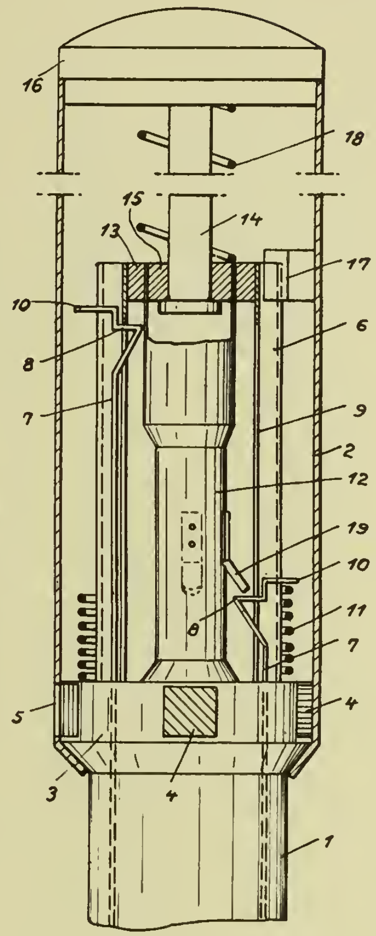
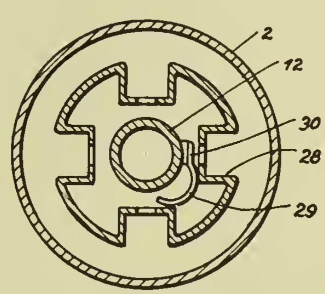


Fig. 7



Inventor:
Georg Meier
By Young, Emery & Thompson
Attorneys

PUBLISHED	G. MEIER	Serial No.
MAY 11, 1943.	CHANGE-PROPELLING PENCIL	388,680
BY A. P. C.	Filed April 15, 1941	2 Sheets-Sheet 2

Fig. 1

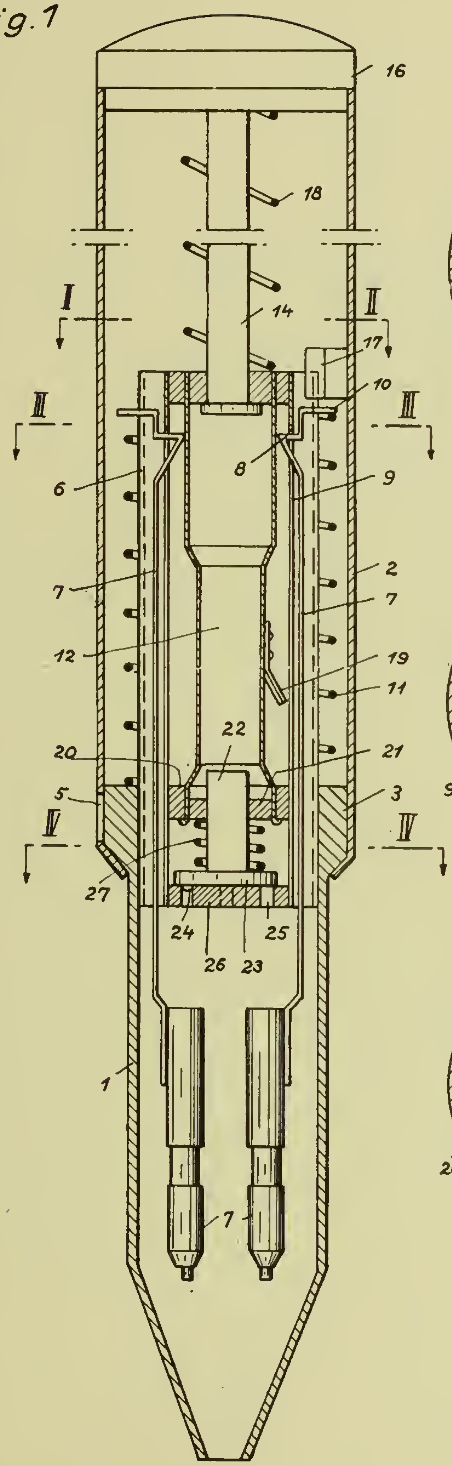


Fig. 2

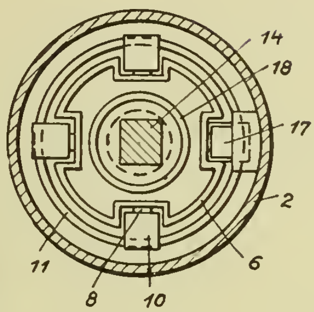


Fig. 3

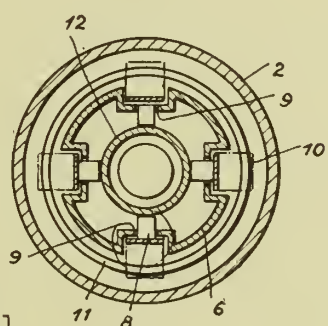
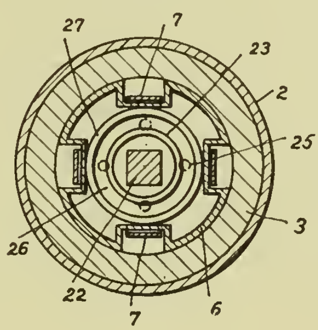


Fig. 4



Inventor:
Georg Meier
By
Young, Emery & Thompson
Attorneys

Published May 11, 1943 Serial No. 388,710

ALIEN PROPERTY CUSTODIAN

ARRANGEMENT FOR AVOIDING ERRORS IN MEASUREMENT DUE TO ONE-SIDED HEATING OF THE CASES OF OPTICAL INSTRUMENTS

Max Maurer, Vienna, Germany; vested in the Alien Property Custodian

Application filed April 15, 1941

It is known that errors which might impair the value of measurement results in an inadmissible degree, are caused by heat dilatation of the cases of long optical measuring instruments, such as rangefinders, astronomical instruments, collimators, telephoto lenses, etc., due to one-sided sun irradiation or to irregular heating caused by temperature gradients or air currents in laboratories.

According to the invention these disadvantages of one-sided heating of optical measuring instruments can be avoided by surrounding the instrument cases by heat insulating materials, such as felt wrappings, and by inserting between the insulating layers flexible layers of good heat conductors, such as copper or aluminium wire nets, wire windings, etc., the function of which is to distribute heat between the hot and the cool parts of the instruments without transmitting any heat tensions to the real instrument cases. If the very temperature elevation caused by this heat distribution should involve errors in observation or measurement, these errors could be easily eliminated in a known manner by appropriate compensation organs provided with bimetallic springs.

To protect this exterior insulating layer against moisture, it is covered by a waterproof coating (rubber or the like).

Obviously the heat leveling effect of the arrangement is increased by use of two or more of such heat conducting layers, eventually separated by felt layers, instead of one.

The invention is shown in the annexed drawing by way of example on the end part of a base rangefinder.

In the tube 1, in the end of which the prism P is located, the optical system consisting of turning wedges K, objective lens O and the other optical elements required (not shown) is arranged in a known manner in an interior tube I. The tube 1 is concentrically surrounded by a cylindrical felt layer 2, the latter is surrounded by a concentric loose copper or aluminium wire net 3 which is again wrapped in a concentric loose felt layer 4 which is finally coated by the rubber skin 5.

Instead of the wire net, a smooth or coiled copper or aluminium wire winding can be used.

By these heat insulating layers, the heat irradiated on one side which by irregular heat dilatation would cause bending of the tube and accordingly displacement of the optical image on the graticule, is considerably diminished and by the inserted wire nettings the small heat quantity still passing through the insulating layers is equally distributed over the whole circumference of the insulating layer inside the metal net. Of course, the more insulating layers alternating with conducting layers are applied, the better is the heat distribution.

MAX MAURER.

[illegible]

[illegible]

[illegible]

PUBLISHED

MAY 11, 1943.

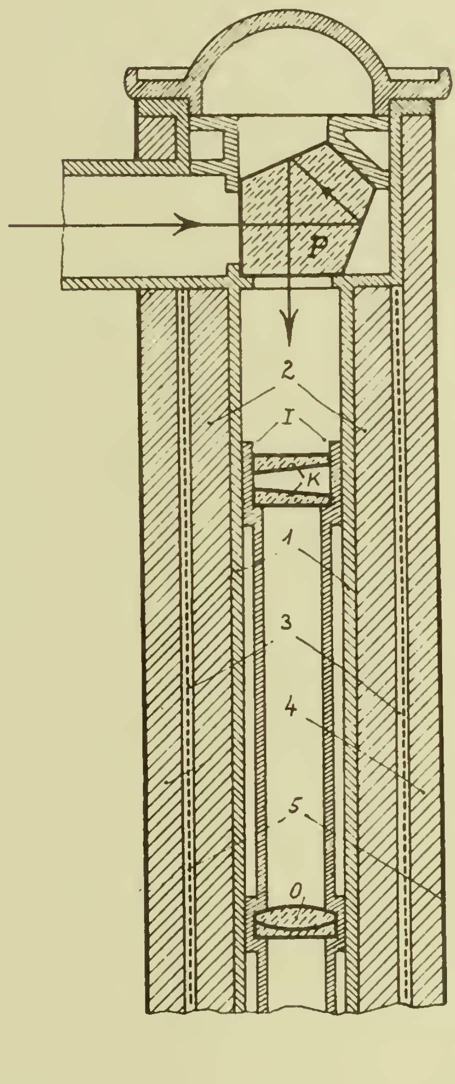
BY A. P. C.

M. MAURER

ARRANGEMENT FOR AVOIDING ERRORS IN MEASUREMENT DUE TO ONE-SIDED HEATING OF THE CASES OF OPTICAL INSTRUMENTS

Filed April 15, 1941

Serial No. 388,710



Max Maurer, INVENTOR.

BY Dowell & Dowell

ATTORNEYS

Published May 11, 1943 Serial No. 390,848

ALIEN PROPERTY CUSTODIAN

PROCESS FOR PREVENTING THE FORMATION OF SCALE AND/OR FOR REMOVING ANY SCALE FORMED IN BOILERS

Irén Kovács, Budapest, Hungary; vested in the Alien Property Custodian

No Drawing. Application filed April 28, 1941

The invention relates to a process for preventing the formation of scale and/or for removing any scale that may have been formed in boilers.

According to the invention the formation of scale in boilers is prevented by adding the resins of the various kinds of Boswellia to the boiler water and operating the boiler in the presence of these resins.

A preferable method of carrying the process into effect is to charge a quantity of resin proportionate to the quantity of water contained in the boiler into the boiler itself. Following this the boiler is operated in the usual manner. After the lapse of a substantial period of operation, e. g. of a period of operation of 2 to 4 weeks, a new charge of Boswellia resin is added. The sludge precipitated is removed from the boiler from time to time.

If scale has already formed on the boiler surfaces, such scale will peel off under the action of the Boswellia resin, and in this condition it will be easily removable. In such a case it will be necessary, pending the time until the peeling-off of the scale is completed, to increase the quantity of resin charged into the boiler at each occasion, and to repeat such charging at more frequent intervals.

Tests have shown that at the start it is advisable to charge 30 to 60 grams of Boswellia resin per cubic metre of water contained in the boiler. The resin, preferably employed in ground condition, is charged into the boiler at the beginning of the operation of the latter. The boiler is operated in the usual manner, the water is fed into it continuously and the sludge formed is blown-off from time to time. We found that, in order to ensure that the resin should exert its action to the best advantage, the boiler should not be blown-off during at least three days following the charging. The charging of resin may be repeated from time to time. Thus, it was found advantageous that a new charge of 30 to 40 grams of resin per cubic metre of water contained in the boiler should be administered after a period of operation of two to four weeks.

In the case of boilers the surfaces of which are covered with scale, the charging of resin is effected at more frequent intervals, e. g. at intervals of one to two weeks. After the fourth or fifth charging the existing scale will as a rule already have peeled off completely, so that during the operation going-on from that time onward complete absence of scale is already assured. It will then be possible to increase the intervals at which resin is administered to, say three or four weeks.

If the boiler water possesses a very high degree of hardness, it will be necessary to employ slightly greater quantities of resin, and at more frequent intervals, and to effect the removal of the sludge formed from the boiler at more frequent intervals likewise. In view of the fact that it is not on a chemical reaction that the action of the resin is based, the quantity of resin to be employed is, between wide limits, independent of the degree of hardness of the water.

After the completion of a period of operation of substantial length, say at intervals of six months' service, the boiler should preferably be shut down and should, after having cooled down, be cleaned of the sludge formed, making use for this purpose of a strong jet of water or possibly of suitable brushes.

Example

A water-tube boiler holding 850 litres of water and evaporating one cubic metre of water per day was covered with a layer of scale of 5 to 6 millimetres thickness. The chemical data of the feedwater employed were the following:

Degree of alkalinity __________ degrees __	4.08
Variable hardness ___ German degrees __	11.44
Invariable hardness ____________ do ____	9.78
Total hardness ______________ do ____	21.22
Quantity of MgO contained in 1 litre of water ____________________ grams __	0.04639
Quantity of CaO contained in 1 litre of water _____________________ do ____	0.1477

50 grams of Boswellia resin were charged into the boiler. On the fourth and fifth day of operation the sludge was blown off. After operation continued during one week, another 30 grams of resin were added and this was repeated another three times; at each occasion the scale formed was blown off on the fourth day following the charging. After the completion of a period of six weeks the boiler was shut down. The scale by which the boiler surfaces were originally covered peeled off completely and its greater part had already become removed in the form of sludge during the period of operation. Following this the boiler was operated during a period exceeding six months, adding 30 grams of resin each month. After the lapse of this period of over six months, either, it was not possible to detect any formation of scale. The sludge removed from the boiler may, after drying and grinding it, be sold as a metal polishing powder. It is also possible to employ Boswellia resin in combination with other water-softening preparations. The resin may, after having been ground, be mixed with some filling material as e. g. with sodium carbonate or sodium sulphate, compressed into tabloids and used in this form, thereby facilitating the charging of the exact quantities required and their uniform distribution in the water contained in the boiler.

IRÉN KOVÁCS.

Published May 11, 1943 Serial No. 390,902

ALIEN PROPERTY CUSTODIAN

FUEL INJECTION PUMP FOR INTERNAL COMBUSTION ENGINES

Helmut Müller and Anton Pischinger, Cologne, Germany; vested in the Alien Property Custodian

Application filed April 29, 1941

The invention relates to a fuel injection pump for internal combustion engines whose pump chamber occupies a position between a positively driven pump piston and a spring-loaded equalizing piston sliding in a longitudinal bore of the pump piston, and is, on the down stroke of the pump piston, connected with the injection port, by means of an opening in the piston wall, so that the equalizing piston injects the fuel and by its displacement in the pump piston again breaks the connection.

The invention consists in providing a cavity in the equalizing piston, which, after the equalizing piston has entirely or nearly broken the connection between the pump chamber and the high pressure injection conduit, connects the latter, for relieving the pressure therein, directly with a space of lower pressure.

In this manner a relief of the pressure conduit is obtained which begins, independently of the speed of rotation of the machine, immediately after the completion of the injection, and which remains uninfluenced by the pressure conditions prevailing in the pump chamber after the injection.

In the drawings are shown by way of example an embodiment of the invention, Fig. 1 showing a a longitudinal section of the equalizing pump at the end of the suction stroke, Fig. 2 at the end of the overflow operation, Fig. 3 during the fuel injection, and Fig. 4 during the pressure relief.

A pump piston **2**, positively driven by a cam (not shown), operated by the engine in known way, and extending into the pump housing **1**, receives in a longitudinal bore the equalizing piston **3**. The pump chamber **4** is in the interior of pump piston **2**. During the downward motion of the pump piston, in which the equalizing piston resting on the annular shoulder **5** does not take part, the pump piston opens the suction port **6** in the pump housing and connects the same, through the annular space **7**, the transverse port **8** and the longitudinal duct **9**, with the pump chamber **4** (Fig. 1), so that the latter becomes filled with fuel. With the next upward movement of the pump piston, it first closes the suction port **6** and the transverse port **8** and carries along, through the medium of the enclosed fuel, the equalizing piston **3**, accompanied by increased compression of the equalizing spring **10**. Thereby the fuel content of the pump chamber is put under pressure of the equalizing spring. With further continuation of the upward motion of the pump piston, the latter connects the pump chamber with the overflow channel **14**, by way of longitudinal duct **9**, cross bore **11**, annular space **12** and opening **13**. As a result of the consequent drop in pressure, the equalizing piston is moved downward under pressure of its spring, and thus discharges fuel into the overflow channel **14**, until the inclined edge **15** of the equalizing piston has moved over the opening **13** in the pump piston (Fig. 2). The pump piston is, in a way well known per se, revoluble about its longitudinal axis, by means of a governor so that, according to the position of the inclined edge over the opening **13**, the covering of the latter occurs sooner or later and thereby a larger or smaller quantity of fuel remains in the pump chamber, for the following injection. In the next instant, the pump piston connects the pump chamber with the fuel injection conduit **17** (Fig. 3) through longitudinal duct **9**, cross bore **11**, annular space **12** and opening **16**. The equalizing piston then moves downward under the pressure of the equalizing spring and causes the fuel to be injected until the equalizing piston has covered the opening **16** by its guide ring or cut-off edge **18**, and at the same time, or slightly before, its control edge **19** has opened the overflow opening **20**, which connects the pump chamber with the overflow channel **14**. As soon as the cut-off **18** has covered or almost covered the opening **16**, the cavity **21**, in the further progress of the downward motion of the equalizing piston, establishes a direct connection between the injection conduit **17** and the overflow channel **14** or other low pressure space, so that the injection pressure in the injection conduit drops quickly to the low pressure in the overflow channel (Fig. 4). As this relief is controlled by the injection-controlling equalizing piston, it occurs whatever the machine speed, always in direct sequence to the injection. Inasmuch as a separate relief is provided for the pump chamber through opening **20**, the relief of the injection conduit is not delayed by pressure remaining in the pump chamber.

HELMUT MÜLLER.
ANTON PISCHINGER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. MÜLLER ET AL
FUEL INJECTION PUMP FOR INTERNAL
COMBUSTION ENGINES
Filed April 29, 1941

Serial No.
390,902

2 Sheets-Sheet 1

Fig. 4

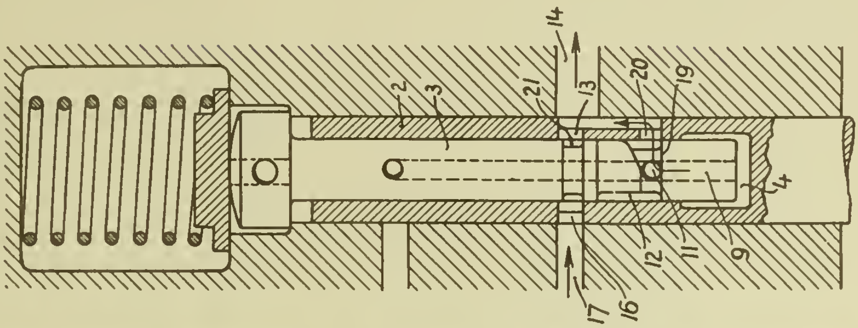


Fig. 3

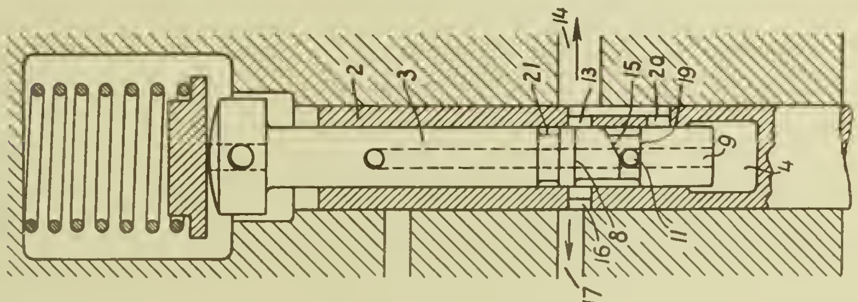


Fig. 2

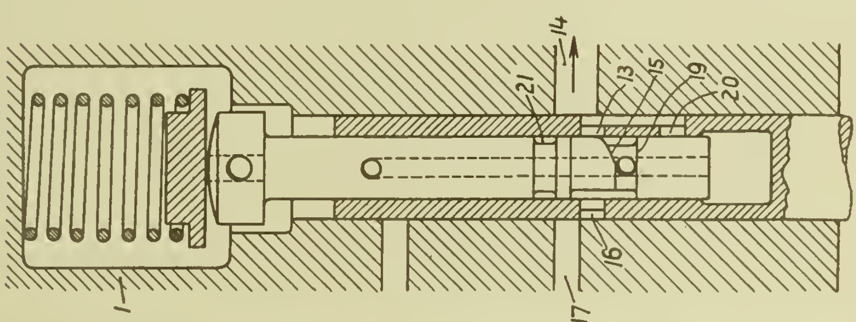
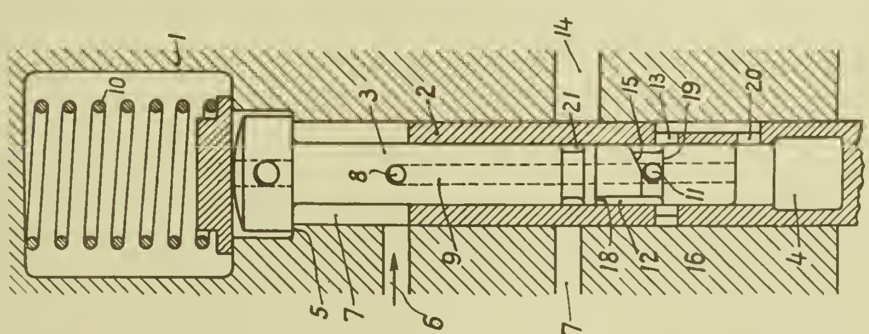


Fig. 1



Inventor:

Helmut Müller

Anton Pischinger

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. MÜLLER ET AL

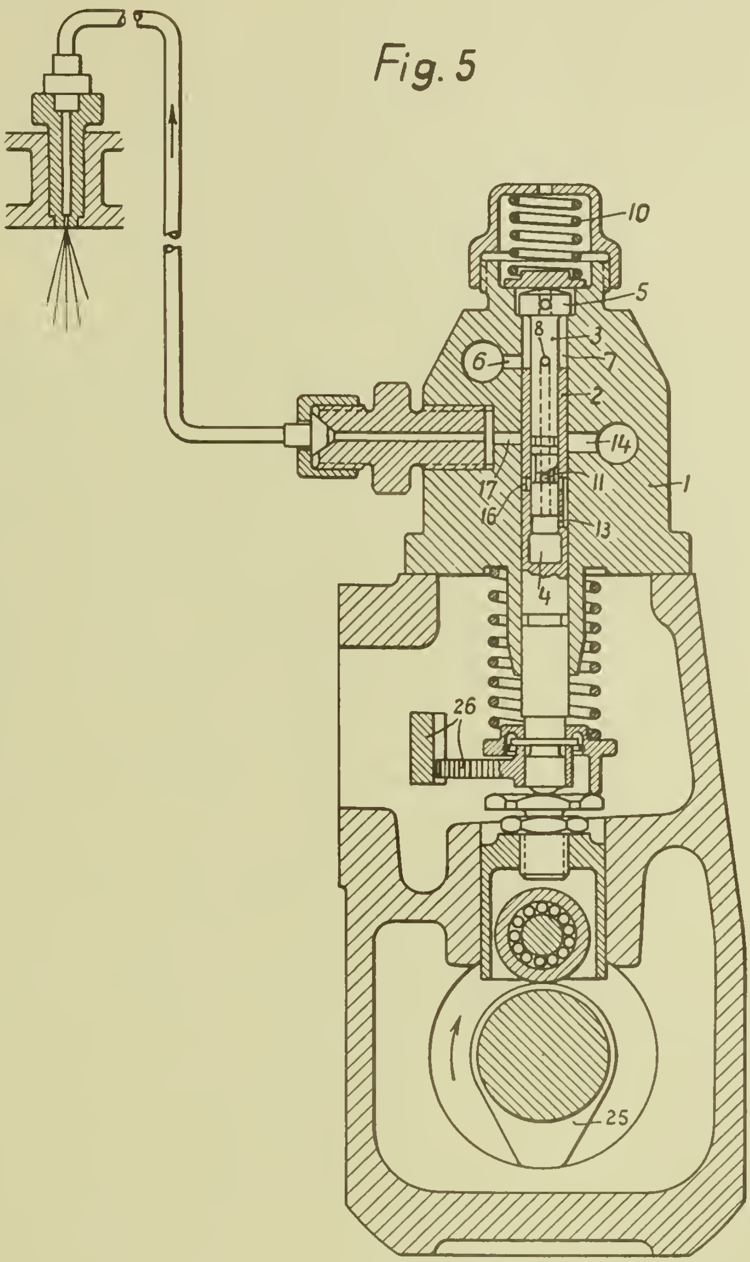
FUEL INJECTION PUMP FOR INTERNAL COMBUSTION ENGINES

Filed April 29, 1941

Serial No. 390,902

2 Sheets-Sheet 2

Fig. 5



Inventor:

Helmut Müller

Anton Pischinger

Published May 11, 1943 Serial No. 391,006

ALIEN PROPERTY CUSTODIAN

LATENTLY HYDRAULIC BINDER

Walter Dyckerhoff, Mainz-Amoneburg, and Wilhelm Wittekindt, Wiesbaden-Biebrich, Germany; vested in the Alien Property Custodian

No Drawing. Application filed April 29, 1941

This invention relates to a latently hydraulic binder. In the well known processes for producing alumina in which the starting material is "opened" or solabilized by heat and the product of this operation is lixiviated with diluted soda solution, after lixiviation a residue is left containing all the constituents of the calcined product which are insoluble in the lixiviating liquid.

Now we have found that this residue possesses latently hydraulic properties and therefore is excellently adapted to be employed as a substituent for trass or Si-material. As a matter of fact, this residue when dried and mixed with Portland cement constitutes a compound cement the strength properties of which resemble those of a normal Portland cement which proves that the addition of this residue not acts in the sense of the addition of an inert material so as to decrease the strengthening properties, but that this material participates itself in the seting and hardening operation.

It is true that it is old to employ, as a hydraulic addition, the so-called Si-material resulting from the solubilization of clay by means of acids and substantially consisting of reactive silic acid. This Si-material in its composition corresponds, owing to its contents of solubilized silicic acid, to a considerable extent to the natural sorts of trass. However it could by no means be expected that the residue obtained by alkaline opening and subsequent lixiviation with water or with an alkaline solution would show the same latently hydraulic properties. We have ascertained that this residue can be used as an additional material for cements participating in the setting process. The hydraulic properties may, however, also be developed by the addition of other suitable substances such as plaster of Paris.

The invention may be more fully explained by the following practical example.

100 kilograms of an aluminous raw material containing about 25 p. Ct of Al_2O_3 are intimately mixed with 150 kilograms of calcium carbonate containing about 96 p. Ct. $CaCO_3$ and calcined at a temperature of from 1400 to 1450° C. The calcined product containing calcium aluminate is lixiviated with a soda solution containing 5 grams Na_2CO_3 per liter. By filtering off the aqueous solution a residue of about 150 kilograms calculated upon dry material is obtained which residue when mixed with a normal Portland cement in the ratio of 70 parts by weight of Portland cement to 30 parts by weight of the dried residue, or of 50:50 respectively for carrying out the normal test shows the following strength properties:

Normal test with the above material mixed with normal sand in the ratio of 1:3

	70:30		50:50	
	Compression	Tension	Compression	Tension
3 days W[1]	288	28	208	22
7 days W	318	29	227	27
28 days W	438	41	325	28
28 days K[2]	515	43	394	38

[1] W=water storing.
[2] K=mixed storing.

Strength test, admixture of Rhine sand 1:3 earth moisture

	70:30		50:50	
	Compression	Tension	Compression	Tension
3 days W	310	29	216	19
7 days W	439	33	332	28
28 days W	536	36	372	32
28 days K	673	53	468	39

WALTER DYCKERHOFF.
WILHELM WITTEKINDT.

Published May 11, 1943 Serial No. 391,220

ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING FLATTENED CONDENSERS

Walter Pfeiffer, Berlin-Spandau, Germany; vested in the Alien Property Custodian

No Drawing. Application filed April 30, 1941

This invention relates to a method of manufacturing flattened condensers of stable form by the use of a dielectric consisting of artificial material.

As is well known artificial foils may be employed as a dielectric for manufacturing electric condensers which possess in part excellent electrical values, particularly a small loss angle and a capacity which remains constant over wide limits. To retain the good properties a condenser of stable form is among other things necessary; for instance, a condenser of the roll type. However, roll condensers present the disadvantage in that they utilize the space of the casing to a very slight extent and it is therefore desirable to manufacture also the reel by the use of a dielectric consisting of artificial material in the form of a flattened condenser. However, the flattened condenser has, on the other hand, the disadvantage that if it is not firmly held in a clamping device it loses its form with time, so that the capacity of the dielectric is no longer constant.

The object of the present invention is to provide a method of manufacturing a flattened condenser of stable form by the use of a thermoplastic dielectric of artificial material, which consists in winding at first the dielectric strips together with the coatings consisting of separate metal foils or of metal coatings applied to the strips on to a deformable hollow mandrel and then in flattening this reel under circumstances at a high temperature by pressing it between pressure bodies and in applying such a heat within the press as to weld the parts of artificial material lying upon each other. In this matter, a condenser of a very stable form is obtained so that it may be inserted in the casing without the use of a clamping device. The condenser is therefore pressed into a flattened form by the simultaneous application of heat in order that the dielectric intermediate layers become more easily deformable and do not break when kinked.

In this case the heating should be so intense as not to fear a softening of the insulating material, whereas the heating necessary for welding the parts of artificial material must be increased to the softening point or to a value in the neighborhood thereof. When welding the parts together it is preferable to apply a sudden quantity of heat which softens only the outer layers or the edges of the strips of artificial material projecting from the ends thereof; in this manner damages of the condenser due to short-circuits or to a reduction of the disruptive strength are prevented.

Furthermore, it has been found advantageous to employ as a mandrel, one consisting of the same or a similar material as the dielectric in order that also the latter is welded when heated together with the wound body so as to form a stable unit; in this manner the condenser is sealed against the atmosphere also from the side of the mandrel.

If the mandrel is caused to project from the wound body at the front side the leads extending to the wound body may be mechanically fixed thereto in a known manner. It is also possible to fix the entire condenser to the projecting end of the mandrel, for instance, to arrange it in the casing as a freely supported condenser.

WALTER PFEIFFER.

PUBLISHED | W. PFEIFFER | Serial No.
MAY 11, 1943. METHOD OF MANUFACTURING FLATTENED CONDENSERS 391,220
BY A. P. C. | Filed April 30, 1941

FIG. 1.

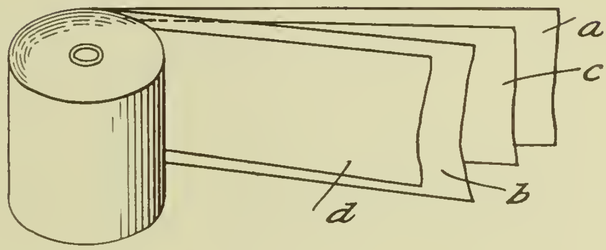


FIG. 2.

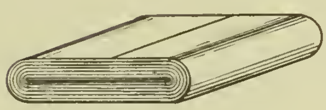
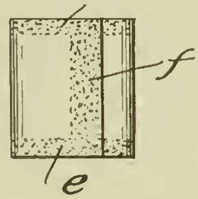


FIG. 3.



Inventor

Walter Pfeiffer

By A. M. Holcombe

Attorney

Published May 11, 1943 Serial No. 392,181

ALIEN PROPERTY CUSTODIAN

VEHICLE BODY

Conrad Schulz, Berlin-Spandau, Germany; vested in the Alien Property Custodian

No Drawing. Application filed May 6, 1941

The present invention relates to a process of fabricating reinforced vehicle bodies from artificial resins and fibrous materials, such as wood.

A method of making vehicle bodies from laminated artificial resin materials has already been proposed. According to this method, the vehicle body is composed of finished wall parts by uniting the marginal portions after the parts have been pressed out of laminated artificial resin materials by using pressure and heat. Paper webs are used as filling material or artificial resin carriers which during preparation are impregnated with an artificial resin material and after placing several layers over one another they are pressed in a die to form an artificial material of great strength. A part of the vehicle body made in this manner is characterized by its high elasticity which is comparable with hardened spring steel. However, the coefficient of elongation or expansion of such material is limited so that a breakage can occur in the case of very violent shocks.

An artificial material of a similar type is known which contains thin layers of disbarked wood in place of the above described paper webs. These wood layers are also treated before the pressing operation with an artificial resin such as on the phenol or cresol basis and after the pressing operation, they form an artificial mass which shows the veining of the wood in a glossy surface.

According to the present invention, there are pressed out of such artificial resin material, which contains the thin wood layers as filling material, the wall parts in one piece for a vehicle body with their marginal portions reinforced for the union and for increasing the strength of the panels. A particularly high resistance or strength of the wall panels can be attained if woods are used which have a high fiber strength as is the case for example with ash, pine and similar long fiber woods. Oak and beech have a very strong fiber bond and are also suitable for making the wall parts.

In order to obtain elastic properties of the wall panels which are satisfactory in every respect, it is advantageous to arrange the wood layers, impregnated with artificial resin, over one another with the fibers of one wod layer arranged crosswise with respect to the direction of the wood fiber of an adjacent layer. The uniting edges are formed by bending the wood layers during the insertion thereof in the pressing dies. Further layers of wood veneers cut into strips are placed thereon for forming the necessary reinforcements and ribs. Additional artificial resin mass, which contains irregularly distributed filling materials, may also be added especially for rounding out the corners and edges and united with the other material during the same pressing operation.

The artificial materials for the construction of bodies for automobiles according to the present invention, which are produced by using wood veneers have the same strength qualities as artificial resin materials with paper insertions. The bending strength attains values exceeding 2,000 kilograms per square centimeter while with respect to the notch shock strength, values exceeding 80 cm.kg/cm^2 are attained.

By using the material herein described the body of artificial material can be made very resistible to all hard stresses and very light for improving the operating characteristics of the vehicle. Moreover, if suitable kinds of wood are used, a very fine surface having a natural appearance can be produced so that a special lacquering will be superfluous. This laminated wood material is also particularly adapted for the inner equipment.

The use of the wood veneer as resin carrier has the further advantage of immediate use and almost complete utilization of the wood from which the cellulose fiber for obtaining paper layers could only be produced with difficulty and with considerable waste.

CONRAD SCHULZ.

Published May 11, 1943 Serial No. 392,524

ALIEN PROPERTY CUSTODIAN

METHOD OF COATING WAX BANDS, BEARING A MECHANICAL SOUND RECORD, WITH GRAPHITE, AND A DEVICE FOR CARRYING OUT THIS METHOD

Arno Woitscheck, Porz, near Koln, Germany; vested in the Alien Property Custodian

Application filed May 8, 1941

The invention relates to a method of coating wax bands, bearing a mechanical sound record, with graphite, and to a device for carrying out this method, it relates particularly to a method and a device for coating bands consisting of a flexible carrier lever with a thin wax layer deposited thereon and bearing the sound record, a number of coadjacent sound grooves being cut into the surface of said wax layer by means of a stylus parallel or nearly parallel to the edge of the band. In the present case, the coating with graphite serves the purpose, known per se, to make the recorded surface of the original sound carrier electrically conductive so that it is possible to produce a matrix thereof in a galvanic bath.

Since long, the general proposal is known to coat the surface of original sound bands, whose sound record layer consists of wax, with graphite; but a suitable method of carrying out such coating with graphite is lacking. Hitherto, coating short pieces of sound bands with graphite could be carried out manually so as to make it possible to produce a matrix in a galvanic bath; but in coating long sound bands with graphite, it was found that certain portions of the surface would not readily take the graphite coating although the graphite coating of these portions of the wax band showed a glossy, metallic black surface.

Investigations have proved that this difficulty is due to the fact that said portions of the surface of the wax band have been overpolished, that is, the graphite has been pressed so much into the wax and has been smeared over with fine wax to such an extent that the individual graphite particles have become highly isolated. Since the adhesion and stickiness of wax is very considerable, it is impossible, even by repeatedly brushing over, to remove a graphite particle, surrounded by wax, out of its position.

According to the present invention, this difficulty is obviated in coating the sound band with graphite by continually and uniformly polishing the graphite powder applied to the recorded surface of the sound band by uniform strokes extending over the entire length of the band until the latter has acquired a glossy, metallic black appearance. By the polishing strokes extending over the whole length of the band it is attained that all parts of the surface of the sound band are treated for a certain uniform period by the graphite coating tool, which advantageously consists of a camel hair brush, and when the surface of the wax band has acquired a glossy, metallic black appearance, the polishing with graphite powder is finished and the wax band is ready for the galvanic treatment. To continue the polishing with the graphite coating tool after this state has been reached is not only useless but detrimental because it leads to said over-polishing of the band.

In order to save room, the invention provides to wind the recorded original sound band helically upon a drum in a manner known per se, and to move a polishing brush, which is continuously supplied with graphite powder, along the drum in accordance with the rotation of the drum and with the pitch of the helical line formed by the sound band. The excess of graphite particles between the contours of the sound grooves are removed according to the invention by means of a rotating brush and are carried off from the surface of the sound band by means of a suction device.

For carrying out said method, the invention provides a device having parallel to the axis of a drum, serving to helically wind upon it the original sound band, a guide upon which there is arranged, shiftable in longitudinal direction, a polishing brush serving to spread the graphite powder applied to the surface of the wax band. The device for supplying the graphite is preferably built into the polishing brush.

Advantageously, the polishing brush is movable and adjustable in radial direction to the drum. In addition, the invention provides that the guide running parallel to the axis of the drum carries, besides the polishing brush, also the rotating brush for removing the excess of graphite particles and the suction device required therefor. The polishing brush, the rotating brush, and the suction device are advantageously fixed to a common slide.

In order to simplify the driving of the graphite coating device, the guide lying parallel to the axis of the drum may consist of a screw spindle having a common drive with the drum. It is advisable to effect the driving by a direct current motor provided with a pole reversing device controlled by the slide of the graphite coating device and serving to change the direction of rotation of the motor, said pole reversing device comprising two contacts adjustable along the spindle, so that it is possible to bring the reversing points of the graphite coating brush in the simplest manner to correspond to the length of the band to be coated with graphite.

A constructional example of a graphite coating device according to the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a front view of the device, and Fig. 2 is a view as seen from the right in Fig. 1.

On a frame 1 there is supported in two bearings 2, 3 a drum 4 upon which the wax band 5 with the sound grooves is wound in a helical line. The frame 1 also carries two bearing brackets 6, 7 holding a screw spindle 8 parallel to the axis of the drum 4. This spindle and the drum are driven by a common motor 9, advantageously a direct current motor, whose shaft 10 is connected via a coupling 11 with a shaft 13 supported at 12 in the bearing bracket 7. On the shaft 13 there is a worm 14 engaging a worm wheel 15 carried by the shaft 2 of the drum. The shaft of the drum carries a bevel wheel 16 engaging a bevel wheel 17 attached to the lower end of a vertical shaft 18, which is supported in lateral projections of the bearing bracket 7. At the upper end of shaft 18 there is a bevel wheel 21 engaging a bevel wheel 22, which is attached to the spindle 8.

The spindle 8 also carries a slide 23 with a corresponding inside thread, said slide being prevented from turning with the spindle by a rod 24, around which it extends, the rod 24 running parallel to the spindle 8 between the bearing brackets 6, 7. The slide carries a brush 25 with camel hair bristles, the brush being linked to the slide and folding upwards by means of a handle 26 or downwards in an end position, in which it is suspended over the drum 4 and may be accurately adjusted with respect to the drum by means of an adjusting screw 27.

The slide also carries a disc-shaped brush 29 having bristles at its circumference and being rotatably supported at 28. The brush 29 may be driven in any suitable manner, for example via a flexible shaft or by means of an auxiliary motor, and is also adjustable by means of an adjusting screw 30 with respect to the drum 4. The brush 29 is disposed in a housing 31 which is open towards the drum 8 in order to give the brush access to the drum. A suction piping 32 is attached to the housing 31.

On the screw spindle 8, at both sides of the slide 23, there are arranged runners 33, 34 shiftable along the spindle and adjustable, each runner being provided with a contact 35 and 36 respectively. These contact runners form a part of a pole reversing device of the direct current motor 9 and are inserted in the circuit of the motor in such a manner that, when the brush slide, in its movement along the spindle 8, knocks against one of the contacts, the direction of rotation of the armature of the motor is reversed. Since pole reversing devices of this kind are known per se, the arrangement of the connections is not illustrated in the drawing.

When starting the graphite coating device, all brushes are at first screwed up. Then the wax band is wound upon the graphite coating drum, during which operation it should be absolutely avoided to touch the wax surface with the hand. At certain distances the wax band is fixed at its not waxed edge to the drum by means of not illustrated clips. When the wax band is completely wound upon the drum, the motor 9 is switched on and the wax band is slightly polished with some wadding. Thereupon some graphite is strewn on wadding, and the band is once more polished slightly. After this preliminary treatment, the contact runners 33, 34 are adjusted to the length of the band, and the brush 25 is carefully screwed down so far that the points of the bristles are only slightly bent. Into the brush 25 there is built a funnel 37 having a number of outlets 36 between the bundles of bristles. The funnel 37 is continually fed with graphite powder, which the brush spreads uniformly over the wax surface. Since the drum 4 rotates without interruption and the brush slide is moved along the drum according to the pitch of the helical line formed by the wax band, the brush performs a polishing stroke extending from the beginning to the end of the wax band. When the brush arrives at the end of the band, the brush slide knocks against the contact 36 and causes the direction of rotation of the motor 9 to be reversed, which also reverses the direction of rotation of the drum 4 and of the screw spindle 8. Then the brush 25 performs the next polishing stroke from the end towards the beginning of the wax band. When the brush arrives at the beginning of the band, the slide knocks against the contact 35, which again causes the direction of rotation of the motor 9 to be reversed, etc.

The time required for the graphite coating operation depends upon the length of the band and the circumferential velocity of the graphite coating drum. The band is properly coated with graphite when its surface has a glossy, metallic black appearance. When this state is reached, it is absolutely necessary to stop the coating with graphite, as otherwise the band will be overpolished.

When the wax band is perfectly coated with graphite, the brush 25 is screwed up, the rotating disc-shaped brush 29 is screwed down, and the suction device is put into operation. The brush 29 exclusively serves to brush out the graphite particles between the contours of the recorded wax band, these particles being drawn out by the air current of the suction device so as to prevent them from settling again on the surface of the wax band. After the entire surface of the wax band has been brushed out and the excess of graphite particles has been sucked off, the whole graphite coating device is put out of operation.

The graphite coating drum is enclosed at the bottom by a box 38, in which the excess of the graphite powder, that has fallen off from the wax band, is collected. This waste of graphite powder is suitable to a limited extent to be used again in the coating process. However, repeatedly used graphite has a considerably reduced conductivity, for which reason it is necessary to continuously add new graphite. The bad state of the graphite is caused by the burning of the pure graphite and the remaining of impurities, such as soot, etc. Therefore, the graphite collected in the box 38 is passed through a very fine strainer and is then mixed with new graphite in the proportion of 1 to 3. The graphite employed must have a fineness of grain amounting to 0.6 to 0.8 of a thousandth part of a millimeter.

ARNO WOITSCHECK.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. WOITSCHECK

METHOD OF COATING WAX BANDS, BEARING A MECHANICAL SOUND RECORD, WITH GRAPHITE, AND A DEVICE FOR CARRYING OUT THIS METHOD

Filed May 8, 1941

Serial No. 392,524

Fig. 1.

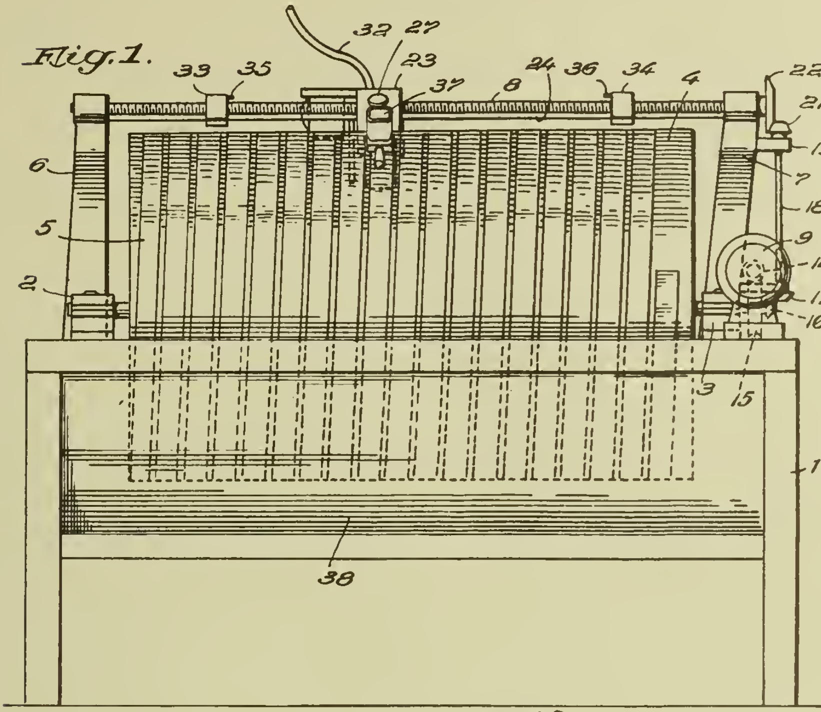
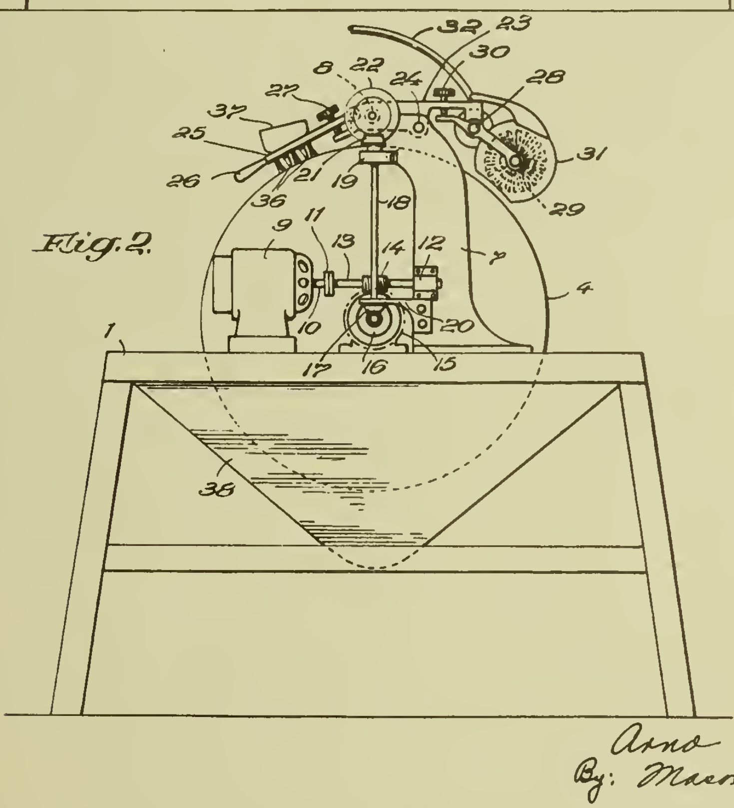


Fig. 2.



Inventor:

Arno Woitscheck

By: Mason & Porter

Attorneys

Published May 11, 1943 Serial No. 392,529.

ALIEN PROPERTY CUSTODIAN

COOL WET DRESSING WITH BANDAGES

Manfred Seng, Berlin, Germany; vested in the Alien Property Custodian

Application filed May 8, 1941

Wet dressings are prescribed and applied either in the form of warm wet dressings which are covered with some waterproof material, as in the case of the well known Priessnitz dressing, developing warm vapours, or in the form of cool wet dressings having a temperature of not much above that of the body and being capable of producing even a cooling effect according to the cover employed. For this purpose, these wet dressings were hitherto secured by means of dry bandages or cloths. These, indeed, prevent the development of warm vapours, but they have the disadvantage that the securing bandage gets wet and that the dressing dries a deal too quickly and loses its effect.

The object of the present invention is to provide a new type of cool wet dressings distinguished by the fact that, on the one hand, the development of warm vapours is prevented and, on the other hand, the dry securing bandage is prevented from wetting through to a degree which irritates the patient.

This is accomplished according to the invention by providing for a cool wet dressing a perforated insertion of waterproof material placed between the dressing and the bandage and being thick enough to prevent the dressing from coming into contact with the securing bandage through the holes of the perforated insertion.

This novel arrangement serves to prevent the securing bandage from being completely wetted through. Undoubtedly, the securing bandage is still wetted to a certain extent, owing to the evaporation through the holes of the perforated insertion, but this wetting may be limited to such a small extent by a suitable size and number of the holes still sufficient to produce a cooling effect of the dressing so that the securing bandage will not be wetted so much as to irritate the patient.

In order that the insertion should have the required thickness without increasing its weight or its stiffness, it may be provided with an uneven surface by forming small hollow projections, ribs, grooves, or the like.

In a special form of construction of the subject of the invention the insertion consists of a rough fabric which is impregnated with a waterproofing substance so as not to fill up the meshes of the fabric.

A constructional example of the subject of the invention is illustrated in the accompanying drawing in which:

Fig. 1 is a view of the article; and

Figs. 2 and 3 are cross sections on the lines II—II and III—III of Fig. 1.

As will be seen from the drawing, the insertion consists of a strip of the required width and of any desired length, which strip is formed by pressing, rolling, or the like, of a homogeneous, non-absorbent, pliable, and sufficiently extensible material.

In the example illustrated, the surface of the insertion is provided with ribs *a* so that, in spite of the small thickness of the material, the insertion is of a considerable stoutness, its weight being much less than that of a bandage of a corresponding thickness. Each rib is provided with perforations serving to conduct away the vapours developing in the wet dressing.

MANFRED SENG.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

M. SENG

COOL WET DRESSING WITH BANDAGES

Filed May 8, 1941

Serial No. 392,529

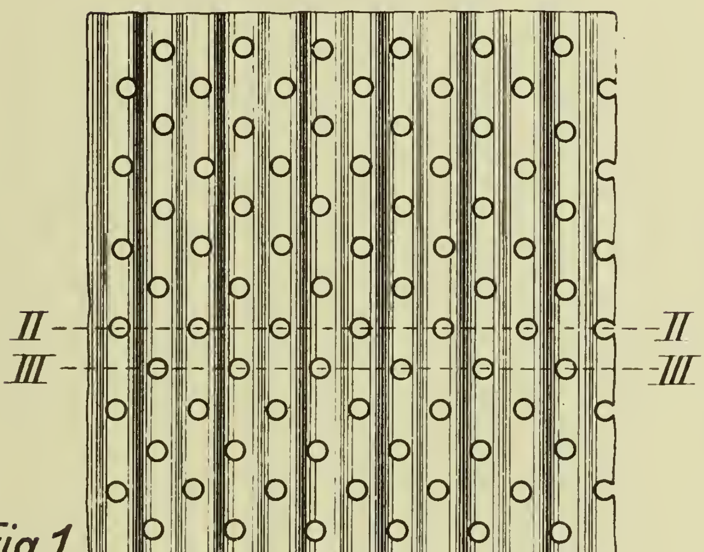


Fig. 1

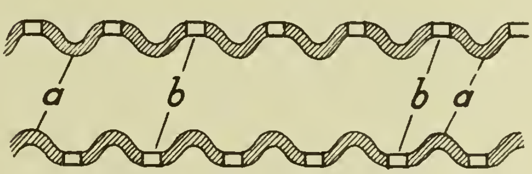


Fig. 2

Fig. 3

Inventor:

Manfred Seng

By Mason & Porter

Attorneys

Published May 11, 1943 Serial No. 392,529

ALIEN PROPERTY CUSTODIAN

COOL WET DRESSING WITH BANDAGES

Manfred Seng, Berlin, Germany; vested in the Alien Property Custodian

Application filed May 8, 1941

Wet dressings are prescribed and applied either in the form of warm wet dressings which are covered with some waterproof material, as in the case of the well known Priessnitz dressing, developing warm vapours, or in the form of cool wet dressings having a temperature of not much above that of the body and being capable of producing even a cooling effect according to the cover employed. For this purpose, these wet dressings were hitherto secured by means of dry bandages or cloths. These, indeed, prevent the development of warm vapours, but they have the disadvantage that the securing bandage gets wet and that the dressing dries a deal too quickly and loses its effect.

The object of the present invention is to provide a new type of cool wet dressings distinguished by the fact that, on the one hand, the development of warm vapours is prevented and, on the other hand, the dry securing bandage is prevented from wetting through to a degree which irritates the patient.

This is accomplished according to the invention by providing for a cool wet dressing a perforated insertion of waterproof material placed between the dressing and the bandage and being thick enough to prevent the dressing from coming into contact with the securing bandage through the holes of the perforated insertion.

This novel arrangement serves to prevent the securing bandage from being completely wetted through. Undoubtedly, the securing bandage is still wetted to a certain extent, owing to the evaporation through the holes of the perforated insertion, but this wetting may be limited to such a small extent by a suitable size and number of the holes still sufficient to produce a cooling effect of the dressing so that the securing bandage will not be wetted so much as to irritate the patient.

In order that the insertion should have the required thickness without increasing its weight or its stiffness, it may be provided with an uneven surface by forming small hollow projections, ribs, grooves, or the like.

In a special form of construction of the subject of the invention the insertion consists of a rough fabric which is impregnated with a waterproofing substance so as not to fill up the meshes of the fabric.

A constructional example of the subject of the invention is illustrated in the accompanying drawing in which:

Fig. 1 is a view of the article; and

Figs. 2 and 3 are cross sections on the lines II—II and III—III of Fig. 1.

As will be seen from the drawing, the insertion consists of a strip of the required width and of any desired length, which strip is formed by pressing, rolling, or the like, of a homogeneous, non-absorbent, pliable, and sufficiently extensible material.

In the example illustrated, the surface of the insertion is provided with ribs *a* so that, in spite of the small thickness of the material, the insertion is of a considerable stoutness, its weight being much less than that of a bandage of a corresponding thickness. Each rib is provided with perforations serving to conduct away the vapours developing in the wet dressing.

MANFRED SENG.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

M. SENG

COOL WET DRESSING WITH BANDAGES

Filed May 8, 1941

Serial No.
392,529

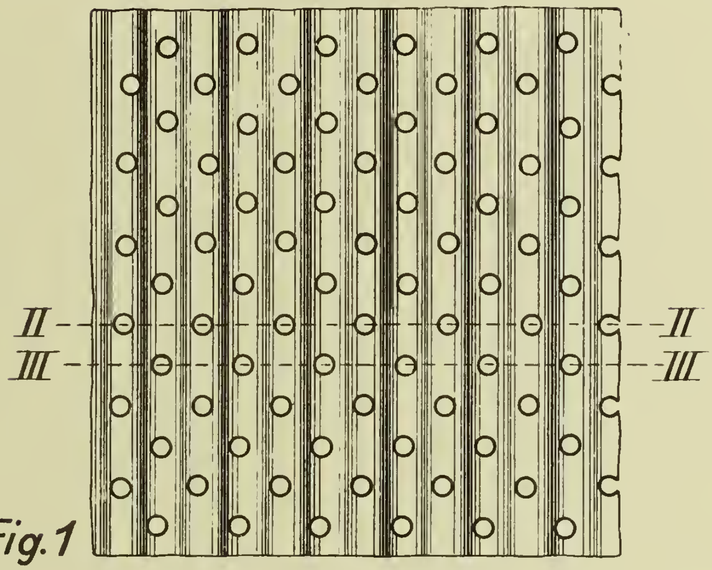


Fig. 1

Fig. 2

Fig. 3

Inventor:
Manfred Seng
By Mason & Porter
Attorneys

Published May 11, 1943

Serial No. 393,434

ALIEN PROPERTY CUSTODIAN

LIFE-SAVING AND EXPLORING DEVICE FOR SUBMERGED SUBMARINE VESSELS

Francesco Lamberti, Genoa, Italy; vested in the Alien Property Custodian

Application filed May 14, 1941

This invention has for its object a life-saving and exploring device, especially adapted for use in submerged submarines.

Hitherto the devices of this kind aimed only to allow the outgoing of men from the submerged submarines, in order to save lives in case of accident. Then, having lost any hope to bring the submarine afloat, the men collect in one or more shelter rooms where the life-saving device is or are fitted. In these shelter rooms the air pressure is highly increased by the action of the outer water pressure leaking through contiguous passages.

When this pressure is rather high (more than three atmospheres), the men cannot endure it many hours, and on the other hand it is necessary to subject the persons to a gradual de-compression. None of the different types of the said devices gives the possibility of reducing the air pressure in the shelter room to the atmospheric one, which is a very prejudicial circumstance for the possibility to save all the survivors, especially when the saving is effected for a man at a time.

By the device according to the present invention the rising of the air pressure in the shelter room is first limited and then gradually lowered to the normal pressure. The service further permits, even by the use of the means on board, to introduce fresh air into the shelter room from the exterior and to let out vitiated air.

This permits of the occupants stationing for a great time without danger within the shelter rooms, until the saving is rendered possible.

The device according to the present invention offers, in comparison with the known life-saving devices for submarines, as that usually called life beacon or life buoy the following features:

(1.) The particular form of hatch in the previous "lift-beacon- devices" is substituted, according to this invention, by the lift itself, which will be referred to hereinafter as "cabin."

(2.) Means are provided for causing the cabin to set itself always in the same position within its container (which will be referred to as cylinder or "pit") each time the cabin returns back thereinto.

(3.) The cabin and the "pit" show corresponding apertures permitting of opening the doors at the same time from inward the safety room.

(4.) With regards to the features under (1.) and (3.), fittings are provided in the cabin top for connection to air, electric and other supply lines adapted to be utilised even when the cabin is brought back to the submarine.

(5.) Cabin and pit doors may be opened and closed from the interior of the cabin and from the exterior of pit, insuring a water-tight closure.

(6.) Means are provided for rendering easy and reliable the going of the cabin back into its pit.

Other objects, advantages and constructive features of this invention will be apparent from the following specifications, by reference to the attached drawings in which:

Fig. 1 is a vertical section (on line I—I of Fig. 2) of the pit and one half of the cabin, the other half being shown in elevation;

Fig. 2 is a plan view in horizontal section of the device shown in Fig. 1;

Fig. 3 is a section of the pit and an elevation of the cabin, the view being at right angles to the plane of Fig. 1;

Fig. 4 is an external detail view, somewhat enlarged, of a device included in one of the contrivances provided for tightly closing the pit door.

Fig. 5 is a vertical section of the device shown in Fig. 4 the section being taken on line V—V of Figure 6;

Fig. 6 is a plan section on line VI—VI of Fig. 5;

Fig. 7 shows in horizontal section some details of the pit and

Fig. 8 is an external view thereof; it is to be noted that in these two figures the same particulars have been shown by dotted lines in order to better point out their shape and position with regards to the other adjacent parts, which are shown by full lines;

Fig. 9 is a view of one of the control members of the pit closing mechanisms;

Fig. 10 is a cross section on line X—X of Fig. 9;

Fig. 11 is a view like to Fig. 7 showing in horizontal section some details of the second closing mechanism;

Fig. 12 is a section on line XII—XII of Fig. 13;

Fig. 13 is a vertical section on lines XIII—XIII of Fig. 12;

Figs. 14 and 15 are a top and bottom view of the cabin;

Fig. 16 is a section on line XVI—XVI of Fig. 17;

Fig. 17 is a section on line XVII—XVII of Fig. 16;

Fig. 18 is a section on line XVIII—XVIII of Fig. 16 and shows the closure members of the pit wall;

Fig. 19 is a section on line XIX—XIX of Fig. 20 showing the control means of the cabin-closing members;

Fig. 20 is a section on line XX—XX of Fig. 19;

Fig. 21 is a further embodiment of the cabin-top showing a preferred arrangement of the vent-ducts.

Fig. 22 is a section through one of the cabin control means;

Fig. 23 is a section of one of the members 11 shown in Figs. 4 to 6, in somewhat modified form;

Fig. 24 is a variation of the device shown in Fig. 18.

The cylinder or "pit" is the housing member from which the cabin starts and in which it returns when hauled down from the surface of the sea. In its whole, it has the form of a cylinder-shaped container with open top and provided externally with reinforcing ribs. Around the top opening the annular projection 1 is fitted, serving for fastening the cylindrical body of the pit to plate 4 which is fixed to the submarine hull. Interiorly, near the border of the said opening, the pit shows an annular seat 3 on which an annular flange projecting from the cabin body seats like a valve, establishing a water-tight closure between the top part of the cabin and the pit.

The pit comprises parts 4 and 5 connected by flanges or the like, the contours of which are projected on the broken line XYZ. For simplicity, the plane of the wall which is projected in XY is shown parallel to the axis of the cylinder to the distance indicated by *d* and, besides cutting the bottom, it cuts also longitudinally the side wall of the cylinder up to Y. It is to be noted that the angle XYZ is somewhat greater than a right angle.

From the form of this broken line it results that only part 4 is rigidly fastened to the platform and therefore to the submarine hull, while the part 5 acts as a door for opening or intercepting the communication between the interior of the cylinder and the environing room, i. e. the shelter room.

The tight connection of the parts 4 and 5 in order to make up the whole pit is effected by providing on parts 4 and 5 some projecting members forming the flanges 6 and 7 (Fig. 7). The width of these flanges is greater than the thickness of the cylinder walls and they serve as connecting members and as reinforcing ribs. Between these flanges packing material 8 may be inserted in order to ensure the necessary tightness of the joint. This is shown in Figs. 7, 11, 12, 13. In order to keep the packing surely within the joint, suitable grooves may be provided in the packing-holding surfaces.

The above connection, which is effected in correspondence of the two vertical parts of the flanges, i. e. along the contact surfaces that are projected along line WY, is performed by means of two distinct devices, which are complementary the one of the other. These two closing devices are a cam member closure, which will be referred to as mechanism A and a closing device comprising a wedge-shaped rod, which will be referred to as mechanism B.

Referring particularly to the top part of Fig. 2 and to the left part of Fig. 3, the mechanism A is such as to permit of member 5 passing from the full-line position (closed position) to the dotted-line position H (opened position) and vice-versa member 5 may be provided with suitable rollers rolling during the angular displacements of the member 5 along suitable curved rails.

Referring particularly to the bottom part of Fig. 2 and to the part at right of Fig. 3, the mechanism B to be employed when the members 5 and 4 are joined together, is provided with a number of jaws or teeth 9 and 10 projecting from the vertical part of the flanges. The profile of teeth 9 is shown by full lines and the profile of teeth 10 is shown by dotted lines. The said teeth are provided with inturned portions and are so fitted as to intermesh with one another in closing position. Between two intermeshing sets of teeth a wedge-shaped rod 11 may be forced, so as to provide for the tight closure of the members 4 and 5. Rod 11 may be suitably ribbed (see Fig. 23) in order to prevent deformation.

In order to ensure a shifting of rod 11 at right angles to the axis 00 of the pit, the following device is provided: A shaft 12 (Figs. 3 to 6), traversing through a suitable stuffing box the pit wall and adapted to be controlled from both sides, carries the worm 13 in mesh with worm-gear 14 fitted on shaft 15 carrying cams 16 and 17. Shaft 15 is supported in bearings 18. Due to this arrangement it is possible to shift the said shafts which are guided in sleeves 19 and 20 carrying cam-slots 21 and 22 operated by the cams and to which the ends of rod 11 are fitted. This therefore is shifted in the direction as shown, in either senses.

Mechanism A (Figs. 3, 9, 13), instead of being provided with teeth, carries in the corresponding part of flanges 6 and 7 two kinds of intermeshing members, viz. bearings 23 and cam-slot like members 24. Also in Fig. 11 the bearings 23 of member 4 are shown in full lines, while the bearings 24 of member 5 are shown by dotted lines. Thus it is seen that the bores of said bearings are differently shaped to suit the different functions of the bearings and precisely the bores of bearing 23 are cylindrical, while the bores of bearing 24 are flattened on one side so as to function as cam-slots.

The said bearings carry the shaft 25 (Figs. 12 and 13) comprising shaft parts proper 26 journalled in bearings 23 and cam parts 27 having a like small excentricity D, (Figs. 9, 10, 12, 13).

Figures 12 and 13 show the flanges of the members 6 and 7 into simple contact with one another within mechanism A. By angularly shifting shaft 25 in the direction of the arrow (Fig. 12), cams 27 act on cam slots 24 and press member 5 against 4. Shaft 25 is controlled by shaft 28, which is arranged symmetrically of shaft 12 with regards to the diametrical plane of members 4 and 5. As shown, shaft 28 passes through a suitable stuffing box through the wall of member 4. It may be controlled from both ends and acts on shaft 25 by means of a transmission comprising worm 29 and worm-gear 79 fitted on shaft 30 which carries pinion 31 in mesh with a gear 32 on shaft 25.

The provision of a secondary shaft in the mechanism B has not been held necessary due to the fact that, by executing in the described order the operation of the two mechanisms for the outer closure of the pit i. e. by forcing first, by means of shaft 15, the rod 11 between teeth 9 and 10, and afterwards, the shaft 25 between the bearings 23 and supports 24 (these operation taking place somewhat gradually due to the elastic packing between flanges 6 and 7) the force exercised on shaft 15 is reduced and that on shaft 25 is increased.

For the same reason other cams, between cams 16 and 17, have not been provided, although their provision is well possible, if necessary.

At the center of its bottom, the pit is traversed

by rod 100 of the centering device, by means of stuffing box 101.

The cabin, (which is the intermediary member serving for establishing the communication and for transferring, within the limits of the possibilities, persons and things between the interior of the submerged submarine and the exterior) shows a substantially cylindrical shape and is set upright (cfr. Figures 1, 3, 14 and 15). It is composed of three parts 40, 41 and 42 and carries to the exterior, in correspondence of the upper contour, the valve member 39, shaped like a valve surface and closing tightly, when seated on seat 3, the upper cylinder end.

By reference to members 40, 41, on which, to the interior of the cabin, the flange-forming projections 49 and 50 are set, by means of which members 40 and 41 may be brought into contact, by establishing a tight joint, it may be noted that the shape of such contours is very like that of the members 4 and 5 of the pit and in fact UVW (Figures 1, 14 and 15) represents their projection on a vertical plane that is perpendicular to the faces of the dihedron in which they are contained; with the difference however, that, within the cabin, the plane of the vertical part of the contact surface of said flanges, which in Figure 1 is projected into UV, has been chosen, for convenience, as passing through the cabin axis. This plane therefore cuts the bottom end (that has been diagrammatically assumed to be plane) along one of its diameters and contains the axis of hinge 43 lying below the cabin bottom. It is to be noted that this hinge serves for permiting of the member 41 passing from the full line position of Fig. 1 (corresponding to the closed position of the cabin) to the position K shown by dotted lines in Figures 1 and 2 (corresponding to the opened position of the cabin).

In order to ensure that the cabin, by coming back into its pit, assumes always the same relative position with regards thereto, recourse has been made to a helical surface which, by revolving on its axis, is compelled to be displaced in one of the two directions along the direction of said axis, and at the same time to pass through a fixed point. In order to practically do this on the outer cabin surface projections 44 and 45 are provided (Figures 1, 3, 14 and 15) the sides of which, that are returned downwardly, form part, as to their form, of two helical surfaces, having contrary winding directions; these projections meet downwardly on one cabin side (Fig. 14) in order to possess a common end, while at their top from their opposite ends, (Figure 15) they connect to two short straight projections, disposed along the generators, and suitably spaced apart in order the abutment member 46 therebetween, (which during the descent of the cabin has acted upon the helical side of one of the projections, by causing first its rotation on its axis) functions finally as a guide member positively shifting angularly the cabin to the desired position. This abutment member may be constituted by a pivot fastened by one of its ends to the inner cylinder wall in the required position in order the position assumed by the cabin may result as required, and carrying a roller on which the helically-shaped side of one of the projections 44, 45 may roll.

The cabin is further provided with outer straight projections 47, 48 (Figures 1, 3, 14 and 15) set on the generators and which, by sliding on the inner border of seat 3 during the descent of the cabin, coact for insuring the coaxiality of the cabin and pit. In order to fully ensure this co-axiality of cabin and pit, to the interior of the cylinder some suitably shaped members are fitted between which the cabin, when it comes to rest on seat 3, will snugly fit in proximity of its bottom. As the cabin is necessarily set within its cylinder in the position in which the side doors of cabin and pit come to lie in correspondence with one another, the communication between the interior of the cabin and the shelter room may take place easily. In fact, after having opened the pit door 5 (dotted line position H) also cabin door 41 may be opened towards the exterior by rotating on hinge 43, until it assumes the dotted line position K. By the way, the dimensions of door 41 are less than those of door 5. As to the manner by which it is possible to tightly close the pit from the interior of the cabin, this is based on the fact that the plane UV of the vertical leaf of the cabin flanges lies arreared, as it passes through 00, with respect to the plane XY of the vertical part of the leaf of the pit flanges. Thus even when the pit is in closing position cabin door 41 is allowed to slightly rotate on hinge 43, between the vertical cabin leaf parts, which were anteriorly into contact with one another, two slit-openings of increasing widths towards the upper side will be formed, which will be faced exteriorly respectively by two pit wall portions forming part of the fixed member 4. Shafts 12 and 28 for controlling the devices A and B are fitted on the upper portions of said pit walls, through which they pass through stuffing boxes, and have flattened ends in order to permit of operating same both from the interior of the cabin and from the shelter room.

Other shafts may be fitted in like manner, in order to increase the autonomy of the cabin: in the drawing shafts 33 and 97 are shown, the latter being adapted to cause the door 5 to be brought against the fixed part by means of a windlass and annexed fittings, so as to perform the tight closure of the pit in the same conditions as those hereinbefore described.

The pressure of the water acts on the outer surface and tends to increase the tight closure between flanges 49, 50 of members 40, 41. This tight closure is however additionally insured by a special device, which will be referred as mechanism C (Figures 16 to 20) and which will be particularly described hereinafter. In the main part of mechanism C a shaft 72 is provided which, by means of worm 73 thereon and worm gear 74 on vertical shaft 51 and through pinion 52, toothed sector 53, connecting rods 54 and 55, arms 56 and 57 and shafts 58 and 59, which latter are provided (Fig. 18) with a suitable number of small arms 60, crooked at their ends so as to form hooks 61, pushes said teeth to come into mesh between the back of the vertical flanges of member 41 and the projections 62 of the corresponding parts of the flanges of member 60, the said projections having a profile as shown in Figure 18.

Figure 24 shows a variation according to which the end of each of the arms 62 is not crooked and acts (like a gear tooth between rack teeth) in a hollow provided on the back side of a suitably guided prismatic member 64, pushing same to come into mesh, with its suitably chamfered edge, in like manner as described by reference to tooth 61. The just described main part of mechanism C corresponds to the last closing step of the cabin. This last step may be effected from the interior of the cabin, while the preceding steps aim to bring the member 41 into contact with

member 40 and are performed by supplementary parts of mechanism C. The first of said two steps simply utilises the hole 65 on the intermediary rib of member 41 (Figures 1 and 19) as well as another hole 66 provided in member 40 symmetrically with respect to the cabin. By means of any suitable flexible binding means, the ends of which are bound to the borders of 65, 66 and which is tensioned like a bow string, the flange of member 41 is drawn towards member 40 and the inner flattened end of shaft 69 is caused to be pushed into a corresponding threaded bore within slide 70. On the other part, in order to perform the second step, i. e. of securing member 41 in the aforesaid position (by eliminating any flexible binding means) it is sufficient to screw shaft 69 into the threaded bore of slide 70 fitted in a short guide, provided in projection 71 carried by the flange or member 40, and along which the slide may be shifted for a short distance.

It may be noted that, provided a sufficient attention is paid, the successive third step of the closing operation by means of mechanism C could be rendered easy by previously filling with sea water the space between pit and cabin.

The upper cabin hatch 42 serves first of all, during the life-saving operations, in order to permit of one or more occupants brought afloat with the cabin, to go out therefrom through the upper opening. The cabin, after its hatch 42 has been again closed, may be hauled down into the pit in order to save other lives.

In order to fasten this hatch 42 in its position, a suitable known system may be employed, by considering also that the said hatch 42 is pressed by the water pressure in the direction in which the tight closure is enhanced. In the drawing (Figures 1 and 21) the hatch carries on its border some projections 80 with intermeshing teeth bent perpendicularly to the exterior, which, when the hatch is seated on the corresponding tight seat, pass between other teeth carried by 40 by the cabin and returned towards the centre. By acting on one of the handles 81, (Figures 1 and 3) one of which is on the inner side and the other one on the outer side of the hatch 42 the hatch will be shifted angularly in such a manner as to cause his teeth to come into mesh with those of member 40, thus fastening same.

Hatch 42 permits of exploring all about, when the cabin is afloat and the submarine is submerged even at a considerable depth. For this purpose a periscope 82 is provided. This method is particularly advantageous, as the floating cabin is much less visible than the characteristic conning tower and, besides being much more difficult to hit, it can be swiftly hauled down and thus the submarine has to come out only when absolutely necessary for employing his weapons.

By reference to Figure 21, it is seen that, according to a modified embodiment, the hatch is provided with an aperture closed by a smaller hatch or cover 83, which can be raised by acting on handle 84 by counteracting the spring 85 tending to close same. By this embodiment, the exploration can be effected by guessing directly around through a slit along the border of 83, above 42.

The possibility of improving the conditions of breathing of the occupants of the shelter chamber is apparent from the above specification, by considering also a detail shown in Figure 21. In this figure a pipe section 86 is shown, integral of hatch 42 and ending on both sides by nipples 87 and 88. Of course a number of conduits might be provided, when desired not only to feed air for permitting to the occupants to comfortably breathe, but also for other purposes, as the feeding other fluids, e. g. compressed air for attempting to bring the submarine afloat. By limiting however the above to the breathing, when the cabin has risen afloat and the hatch 42 (or also simply the small cover according to the modified form) is opened, one of the ends of each of the two pipes with which the submarine is fitted will be sleeved on the corresponding nipples, as shown by 86. The pipe ends might be held up e. g. by means of suitable pneumatic beacon, carrying also preferably a small unit comprising a motor and an air pump. The ends of the pipes connected to the cabin will follow same when hauled back and will fit within the pit, in which, by opening doors 4, 51, by means of the inner connections, the said pipes will be connected according to whether they have been employed for feeding fresh air or for letting out vitiated air. In order to perform easily this operation, a pair of auxiliary motor pump units could be provided. It is also apparent that in like way other fluids and also electric power might be fed, by means of suitable lines.

Within the space 95, to the exterior of the cabin and below its bottom, the end of a preferably metallic rope 90 is fastened (see Figure 3) when the same should be allowed to come afloat and to be hauled down into the pit. The rope or cable 9 may also serve at the same time as supporting guard for any electric cables (phone, electric line, etc.) connecting the cabin with the submarine.

In order to wind up and to unwind the cable as necessary, a windlass is provided the reel of which is distinguished from the usual hawser reels in that it is closed within a casing that is into communication with the cylinder through a duct within which the cable is contained which runs on pulleys whenever necessary, as shown by 89. The windlass shaft, by traversing the casing through a stuffing box, is provided at its outer end with a crank handle. The winding and unwinding of the rope within the cylinder is controlled by a centrer, which comprises a member composed principally of a mechanism E, shown in Figures 1, 3 and 22, having a rod 100 to the upper end of which it is fastened. Rod 100 traverses at the center the cylinder bottom. Within mechanism E, sleeve 102 (Fig. 22) is directly fastened to the rod, contains the journals of pulleys 91, 92 and is integral of a number of spider arms 104 to 108 that are provided at their ends with rollers. The arms 104, 105 and 107, by sliding longitudinally of the axis on the inner cylindrical surface of the cylinder serve for guiding the centrer in its displacements longitudinally of the axis. The arms 106 and 108, by sliding within grooves 109 and 110 (Figures 2, 3, 5 to 7 and 11 to 13) along two generators of said surface serve for avoiding that the centrer revolves about its axis. For illustration purposes the said grooves have been shown in correspondence to the inner borders of the vertical parts of flanges 6 and 7, on Figures 11 and 7. The remaining sleeve 103 is axially idle on sleeve 102, from which it is carried by means of pivot 111.

By the sides of sleeve 102, within suitable hollows, contiguous pulleys 91 and 92 are fitted on the grooves of which the rope 90 is passed which comes into E and by passing axially through an axial bore of pivot 111 it comes out in the direction of the shaft between the grooves of pulleys 93 and 94, which are also contiguous and are fitted within sleeve 103, acting as centrer head and are

connected in suitable manner by their free end to the hollow 95 of the cabin. The lines which, as said may be provided within the interior of rope 90, will extend beyond the ends of the rope and be connected to their apparatuses of use, as the phone etc. The like may be said for the other rope end.

A device for transmitting the suitable shiftings to the centrer along the pit axis is shown in the lower part of Figure 1: The rod of the centrer, which is extended downwardly, is also the piston rod of the hydraulic press 120 which is operated by a small pump 121 and constitutes an auxiliary means of the centrer. The desired shiftings of the centrer are obtained by means, of a differential valve 122 serving through cocks 123 and 124 to establish the communications with the water pipes coming from press 120, and leading to the suction and delivery valves of pump 121. In order to render it possible to discharge into the sea the water contained within the cylinder, after the cabin has come back thereinto, the same pump 122 might be employed, provided a suitable system of piping and switch cocks be provided. On the contrary, an introduction of water under pressure could be desired between cabin and pit, in order to overcome possible frictional and other resistances hindering the free ascension of the cabin, and especially its leaving seat 3.

In order to improve the method for manoeuvering the cabin, especially whenever the submarine hull lies inclined, a "rectifier" is provided, which consists of a ring 130 fitted to the exterior of the hull, co-axially of and facing the top opening of the pit and fastened by means of enlarged portions 132 to rods 131 traversing, through stuffing boxes, the platform 2. By shifting rods 131 simultaneously and parallelly by equal lengths in the common direction through a mechanism of a known type (e. g. by screw-threading the lower part of the rods and by acting thereon by means of screw nuts operated simultaneously by means of a suitable shaft, or also by a pair of transmission units each comprising a pinion and a rack) the desired shiftings of said ring will be obtained.

Whenever desired to haul the cabin into the pit, the ring 130 (the diameter of which is just that for permitting of the cabin snugly passing therethrough) is gradually brought to a suitable distance from the upper opening of the cylinder, whereafter, having brought the centrer to its upper position, the bottom of the cabin is hauled down towards the centrer head. On the other hand the ring 130, in its upward movement, by sliding along the periphery of the cabin, or also along the longitudinal projections thereof, draws the cabin with its axis nearer to that of the pit. If at this point the centrer is hauled down together, whenever possible, with the rectifier, by simultaneously drawing the rope the cabin will be compelled to come back again into the pit until its ring 39 comes to lie on seat 3.

If, on the contrary, the cabin should go out of the cabin, it will be convenient to proceed as described, but in inverse order, in order to conserve the co-axiality of the cabin and of the pit until the former is completely out of the latter.

In order to complete the description of the device, that has been shown only by way of example, it is to be noted that the shaft 33, that can be controlled from the interior of the cabin, as well as from the room within the pit, serves for opening and closing valve 34 intercepting pipe 35 which puts the sea into communication with pump 121. In Fig. 1 a short valve pipe section 37 is shown, which, by establishing the communication between pipes 35 and 38, permits of putting the interior of the pit into communication with the sea as well as to intercept this communication, as desired, e. g. whenever the cabin should be thrown out or hauled into the cylinder, as mentioned.

36, Fig. 1, is an automatic vent valve through which the air within the pit is discharged, whenever the same is to be filled with water. This valve is constituted of a box provided at its bottom with a drainage cock and laterally with a vent valve. The box contains a float serving, by acting on a suitable valve, for intercepting the communication with the pit, whenever the water therein has reached such a level, as to flow over into the box.

Within the cabin also the three-way cock 75 (Figures 1 and 21) is fitted so as to either put the interior of the cabin into communication with the pit, room or to permit of the pit, communicating with the sea.

76 (Fig. 1) is a small pump the suction side of which is into communication, through pipe 77, with cock 75, while the delivery leads to the interior of the pit through aperture 78 provided in the cabin wall. Thus it is possible, by suitably setting cock 75 so as to open the suction from the sea, to obtain, by the action of said pump, a positive pressure within the pit, for the aforementioned purposes.

The operation is as follows: The cabin has a sufficient buoyancy in order to bring its own weight, as well as that of the occupants and materials, to the surface of the water. Assumed the submarine be under water, but not inclined provided some persons can help the persons to be saved, by remaining outwardly of the device, by introducing themselves into the part 40 of the cabin when the door 41 is lowered, the persons and materials to be lifted up, within the buoyancy limits of the cabin, will close both pit and cabin and open valve 34 and the cock on pipe 37. Thus the water will flow into the pit, all around the cabin, and the air will be consequently expelled through the above described vent valve. It may be mentioned that, when within the pit and all about the cabin water under the environing pressure is present, this is not sufficient for causing the cabin to leave its seat on the pit. In order to effect this, it is sufficient to intercept pipe 37 and to generate within the cylinder an extra pressure by operating one of the pumps 76 or 121 and to provide for replacing with new water the space of the pit just left free by the ascending cabin. As soon as the cabin is completely out of the pit its lifting speed steadily increases and in order to avoid an excessive speed, its ascension will be suitably braked by the same windlass that has been described above.

When it is desired to haul the cabin back into the pit, it will be sufficient to pull the rope by means of the windlass, while the centrer is left in its upper position. When the cabin has come into contact with the upper end of the centrer, this will be retired by means of the hydraulic press and by co-action of the windlass, until the centrer has reached its lower position and the cabin is seated on 3. In order to ascertain this, usual signalling means will be provided, as a lamp or other luminous and if necessary, acoustical signals. In order to control the tight seating of cabin on its pit some water will be pumped from the space between the pit and the cabin in order to detect whether a sufficient reduction of pres-

sure takes place. In this latter case it will be possible to proceed with the life-saving operations.

In case the hull is inclined, the saving of the lives will present no difficulty until some persons remain out of the cabin and can operate the centrer and the rectifier. In order however to save the life of the last occupant of the submarine, the following additional means are provided.

The cylinder 120 of the press is provided on its top end with a port which is closed in normal use, when the cylinder acts as hydraulic press, but serves as a vent, when the port is uncovered. The lower side of the cylinder is put into communication with a reservoir containing compressed air by means of a pipe provided with an automatic valve of suitable type, which opens and establishes the communication of the compressed air reservoir and the cylinder when the pressure of the water within the space between pit and cabin has reached a sufficient value. In order to avoid a ramming action of the piston head against the bottom of the cabin, suitable means are provided, as, e. g. a two-part sleeve having the parts adapted to be connected by bolts or the like and which can be fitted when necessary so as to envelop sleeve 103 with its border fitted in such a manner as to transmit the pushing action. It is to be noted that the last occupant will first set the rectifier ring 130 a certain distance above the cylinder end, so as to provide for an additional guide before the cabin leaves completely the pit.

The operation of this device is apparent, as are also apparent the advantages inherent thereto.

It is to be noted however that, although the device has been described completely, including some constructional feature which may be embodied in a number of other different ways, this has been done only in order to give a complete constructional embodiment of the invention and it will be understood that the said accesory devices will be claimed only in combination with the basic idea of the invention, as set out in the preamble and as will be claimed hereinafter.

FRANCESCO GUIDO LAMBERTI.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. LAMBERTI

LIFE-SAVING AND EXPLORING DEVICE FOR SUBMERGED SUBMARINE VESSELS

Filed May 14, 1941

Serial No. 393,434

4 Sheets-Sheet 1

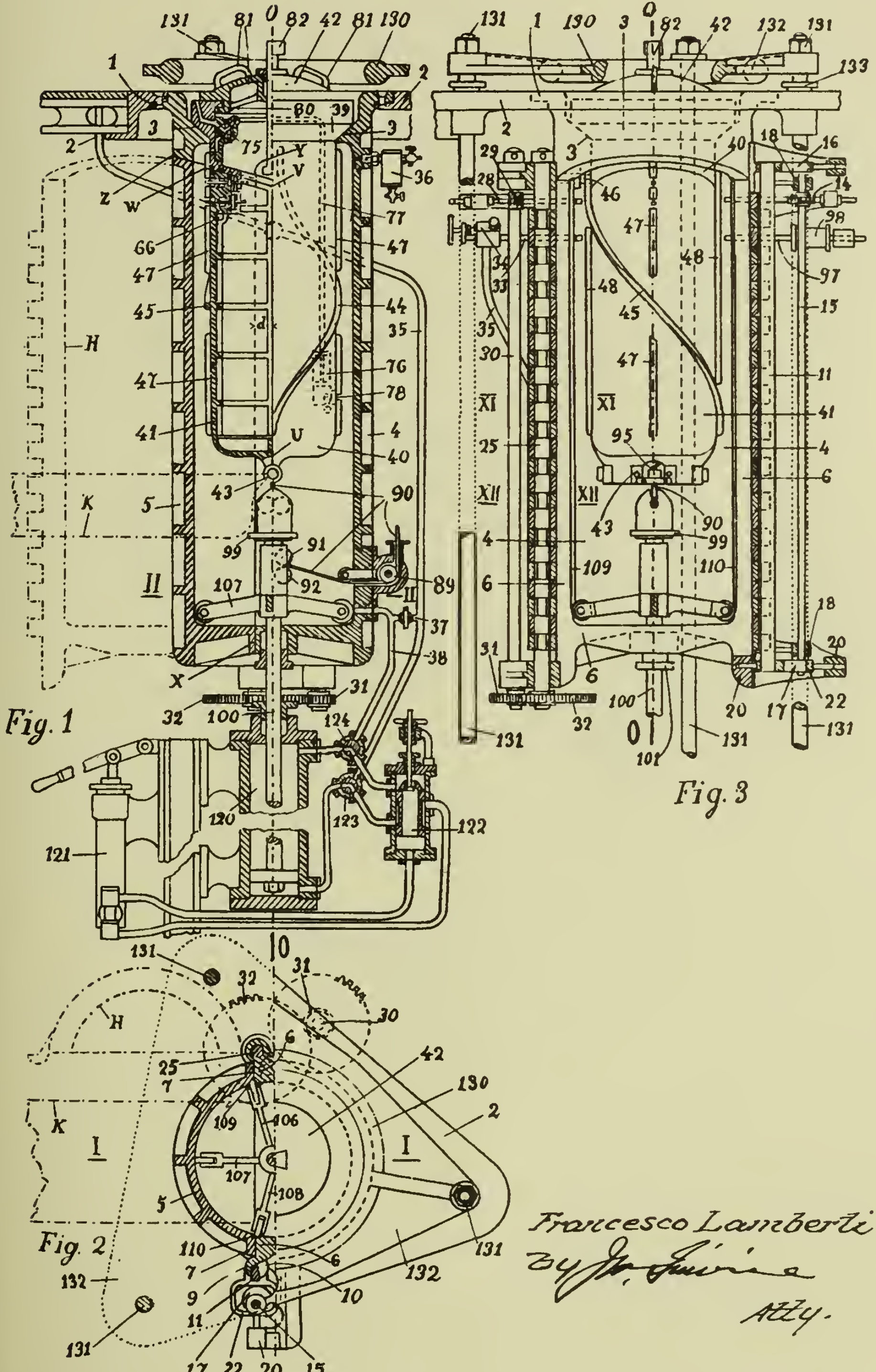


Fig. 1

Fig. 2

Fig. 3

Francesco Lamberti

By

Atty.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. LAMBERTI

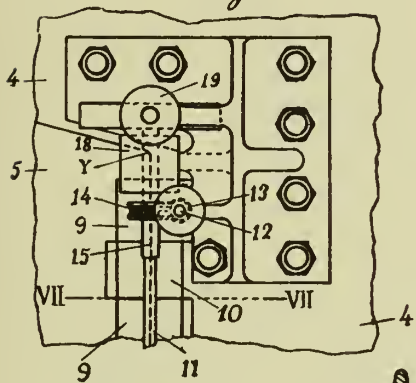
LIFE-SAVING AND EXPLORING DEVICE FOR SUBMERGED SUBMARINE VESSELS

Filed May 14, 1941

Serial No. 393,434

4 Sheets-Sheet 2

Fig. 4



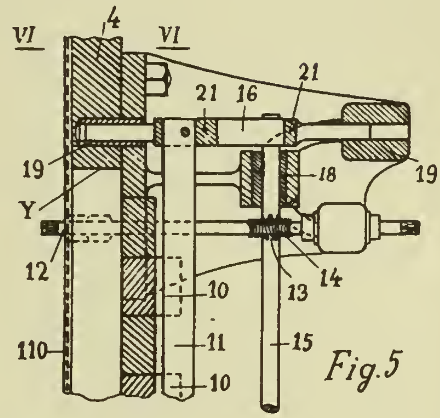


Fig. 5

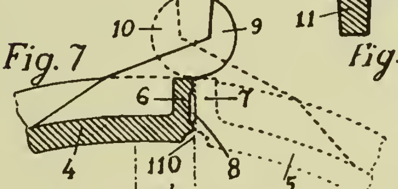


Fig. 7

Fig. 23

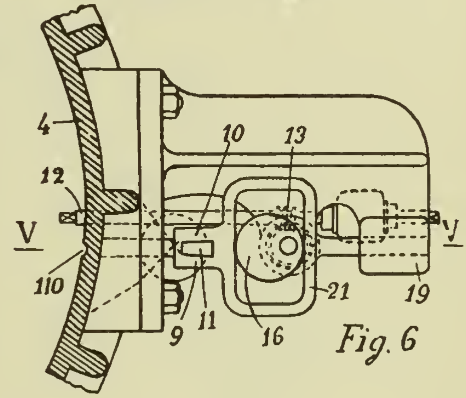


Fig. 6

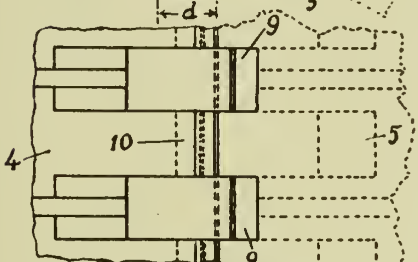


Fig. 8

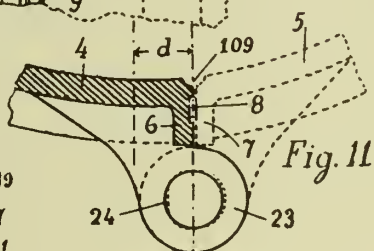


Fig. 11

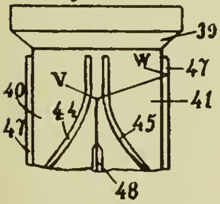


Fig. 15

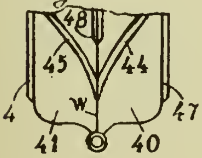


Fig. 14

Francesco Lamberti

By [signature] Atty

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. LAMBERTI
LIFE-SAVING AND EXPLORING DEVICE FOR
SUBMERGED SUBMARINE VESSELS
Filed May 14, 1941

Serial No.
393,434

4 Sheets-Sheet 3

Fig. 10

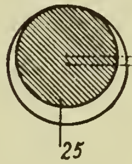


Fig. 9

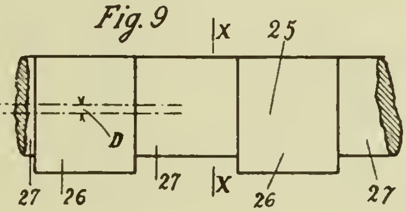
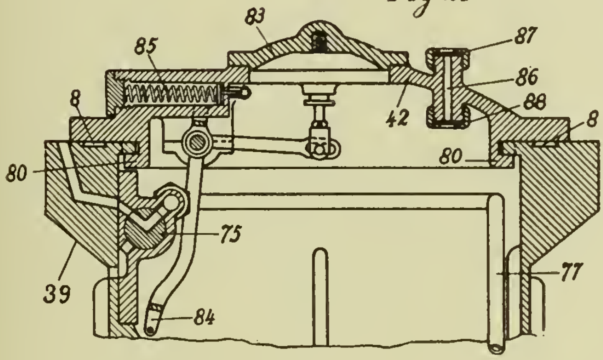


Fig. 21



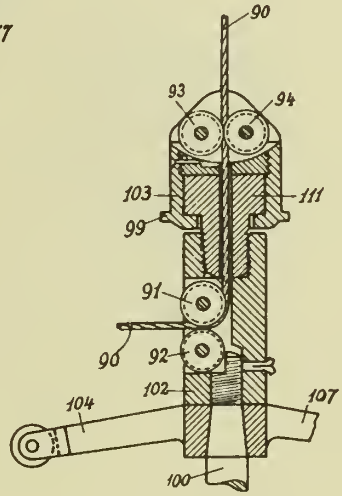


Fig. 22

Fig. 13

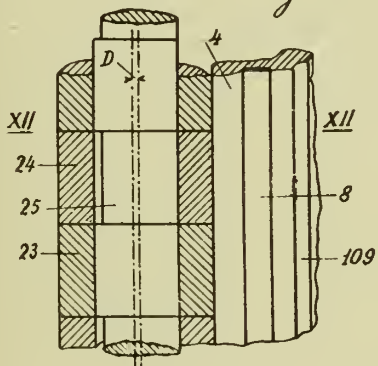
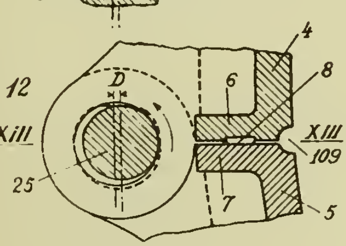


Fig 12



Francesco Lamberti
By [signature]
Atty

PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. LAMBERTI
LIFE-SAVING AND EXPLORING DEVICE FOR
SUBMERGED SUBMARINE VESSELS
Filed May 14, 1941

Serial No.
393,434

4 Sheets-Sheet 4

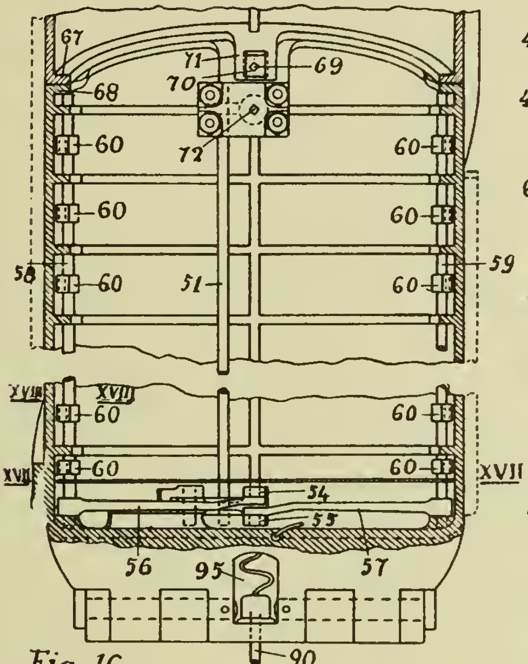


Fig. 16

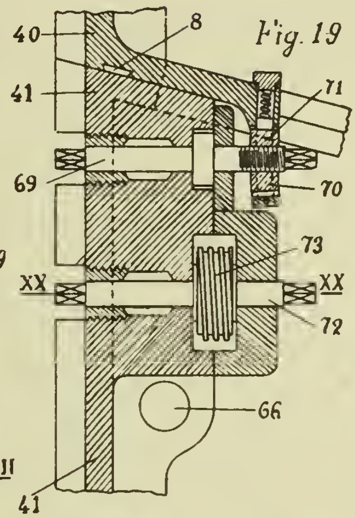


Fig. 19

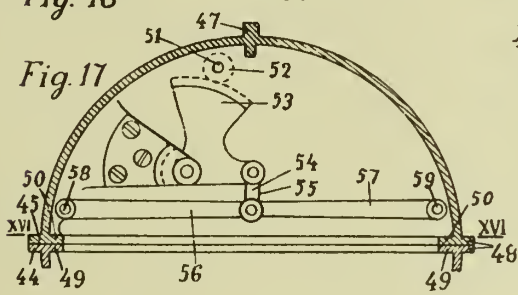


Fig. 17

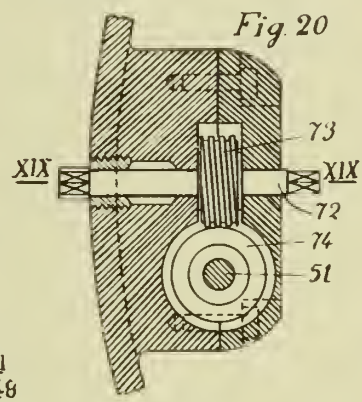


Fig. 20

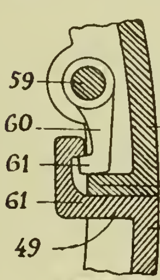


Fig. 18

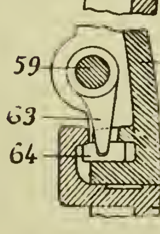


Fig. 24

Francesco Lamberti

By [signature] Atty

Published May 11, 1943 Serial No. 394,417

ALIEN PROPERTY CUSTODIAN

PRODUCTION OF GALVANIC DRY CELLS

Erich Marhenkel, Berlin-Tegel, Germany; vested in the Alien Property Custodian

Application filed May 21, 1941

This invention relates to certain improvements in the production of galvanic dry cells of the type having an electrode which is in contact with an electrolyte containing a swelling agent, and a depolarisation counter-electrode. For the sake of simplicity, the first mentioned electrode will be hereinafter referred to as the "zinc-electrode", and the counter-electrode will be hereinafter referred to as the "carbon" or "depolarisation electrode", although I wish it to be understood that other suitable electrode materials may be used in place of zinc and carbon.

According to the invention, the zinc electrode is separately covered with the electrolytic paste, and the depolarisation electrode is also made separately, the two electrodes then being pressed together and maintained in their compressed position. The compression of the electrolytic paste with the depolarisator electrode is required in order to attain an intimate contact over the whole surface of this electrode. Before being assembled with the finished depolarisation electrode the zinc electrode is covered with one or more layers of the electrolyte which contains the swelling materials and has been applied to the zinc electrode in the required composition and quantity. This layer, or layers, are so composed that their outer surface (i. e. the boundary layer between the electrolyte paste and the depolarisation electrode) before assemblage of the electrodes is capable of withstanding a pressure of at least 160 grams per square centimeter, and when exposed to this pressure in contact with an absorbing layer of the type represented by the depolarisation electrode owing to its capillary forces does not yield more than 5 cubic millimeters of liquid per 1 square centimeter of its exterior surface or boundary layer.

An electrolyte mass or paste of this kind can be made in various manners. For instance, the electrolyte liquid may be provided with a proportion of a swollen swelling agent in excess of that required for binding the electrolyte. If, for example, native starch, or substances containing native starch, or other substances requiring an additional treatment in order to be transformed into a swelling form are used, the electrolyte mass is heated to a degree, or left untouched for a length of time which is sufficient to cause swelling of the swelling agents. Where native starch is used, the same is preferably subjected to a temperature of about 60 to 80° C in order to be converted into swelling starch.

Suitable swelling substances are, for instance, native starch or products containing native starch, alkyl cellulose ether, tragacanth, agar-agar, swelling cellulose, polymeric vinyl alcohol, inorganic adsorbents, such as, kieseguhr, silicic acid gel, pumice stone powder, or mixtures thereof.

It is also contemplated, in accordance with the present invention, that fibrous materials, such as, cut wadding or short fibres, such as, staple fibre, may also be added to the electrolyte, in order to solidify the electrolyte paste.

It is old to use as an electrolyte-carrier paper substances withstanding the loosening tendency exerted by the depolarisation electrode, but paper on being subjected to pressure readily yields the absorbed liquid; moreover, elements using paper carriers have a relatively high internal electric resistance, since the electrolytic conduction is established only through the pores of the paper which are filled with the electrolyte liquid.

According to another known method the electrolyte is entered into the element in its original non-thickened condition. In order to be able to pour the electrolyte into the element in one batch, a film of the swelling substance, e. g., the starch, is applied to the zinc electrode and the electrolyte is filled into the empty space remaining between this film and the depolarisation electrode. According to another known method the zinc cup after insertion of insulating disks on its bottom is filled with a swelling substance, for instance flour dough, and placed into boiling water for swelling the starch. On removal of the zinc cup from the water bath the flour paste not adhering to the zinc mantle is poured out and the depolarisation electrode is inserted in such a manner that between the flour film and the depolarisation electrode a free space is left which is filled with the electrolyte containing flour. The cell is now again placed into boiling water to swell the starch that has been filled in. The second boiling operation may be omitted if suitable thickening agents are added to the paste.

I have found that in dry cells made in accordance with the present invention the electrolyte paste or liquid separated therefrom can be effectively prevented from penetrating the air channels of the depolarisation electrode and rendering the parts concerned of the inner depolarisation surface ineffective by obstruction of said air channels. This desirable effect is not attained in the two methods last mentioned, since in these methods electrolyte liquid which has not yet thickened comes into contact with the depolarisation electrode.

Furthermore, it will be noted that an electrolyte in the form of a soft paste as it was com-

mercially used so far, is unable to resist effectively to the tendency by the depolarisation electrode of becoming loose by itself, as a result of the formation of chemical reaction products during the discharge of the element.

Examples

Example 1.—30 grams of ammonium chloride, and 10 grams of zinc chloride water-free) are dissolved in 100 grams of water. 40 grams of wheat flour are admixed to 100 cubic centimeters of this solution. This mass constituting the electrolyte containing the swelling agent is applied to the zinc electrode in a layer having a thickness of 3 millimeters, and heated to 70 to 80° C for about 3 minutes to convert the flour into the gel state. The depolarisation electrode and the zinc electrode are then assembled to form the complete element.

Example 2.—30 grams of ammonium chloride, 15 grams of zinc chloride (water-free), and 5 grams of calcium chloride (water-free) are dissolved in 100 grams of water. 30 grams of tragacanth powder and 7,5 grams of pumice stone powder are admixed to 100 ccm of this solution and the mass is applied on the zinc electrode in a layer having a thickness of 3 millimeters. The zinc electrode thus provided with the electrolyte layer is then let stand for a period of 12 to 15 hours. The depolarisation electrode and the zinc electrode are then combined to form the element.

Example 3.—32 grams of wheat flour and 5 grams of cotton wadding are finely distributed in 100 cubic centimeters of a solution of magnesium chloride having a concentration of 30° Baumé. This mass is applied to the zinc electrode in a layer having a thickness of 3 millimeters and the zinc electrode thus provided with the electrolyte is then allowed to stand for a period of 24 hours. The starch of the wheat flour is converted into swelling starch by the magnesium chloride. The depolarisation electrode and the zinc electrode are then assembled to form the element, in the manner hereinafter described in connection with the drawings.

Example 4.—25 grams of ammonium chloride and 5 grams of calcium chloride (water-free) are dissolved in 100 grams of water and 35 grams of swelling starch are added to 100 cubic centimeters of this solution. This mass is applied to the zinc electrode in a layer of a thickness of 3 millimeters and the zinc electrode is then let stand for 10 hours, whereupon the zinc electrode and the depolarisation electrode are assembled to form the complete element.

The advantages offered by the electrolytic paste in accordance wtih the present invention become apparent with elements in which the depolisation is effected by air, and with other elements with surface depolarisation. Furthermore, this electrolyte paste offers advantages where the element is fitted with a depolarisation electrode whose inner structure must not be altered by yielding or absorbing electrolyte liquid, or by loosening.

The output of dry cells, more particularly, of cells with surface depolarisation, can be further enhanced by bringing pressure to bear on the electrolyte layer of the zinc electrode during the discharge of the element, for forcing the electrolyte paste into contact with the deeper-seated layers of the depolarizer which are still effective. The pressure of the electrolyte paste is produced as a result of the fact that the volume of the electrolyte is growing during the discharge, the electrolyte being liquefied by the formation of zinc chloride at the boundary layers between the zinc and the electrolyte. In order to cause the pressure due to the expansion of the electrolyte to become effective in the direction of the depolarisation mass, a seal is provided for the electrolyte at this point, this seal being liquid-tight, pressureproof and sufficiently resistant to the chemicals of the electrolyte.

According to an important feature of the present invention, such a seal is produced in this manner that the electrolyte paste is filled into a separate container, preferably in the form of a shallow disk or cup, which is filled approximately to its rim and then with its rim is fixedly pressed upon the depolarizer mass and secured in this position. The container may consist of any insulating material, e. g., synthetic resin, which is not liable to be substantially attacked chemically by the electrolyte or by the reaction products produced during the discharge of the element. The zinc electrode is accommodated in this container. Where the container does not consist of insulating material, but is formed, for instance, by the zinc electrode proper, the rim of the container according to the invention is protected against electric contact and short circuit with the depolarizer layer by means of a non-conductive separating layer. To this end, for instance, a narrow strip of strong paper may be arranged between the zinc edge and the depolarizer layer, but preferably the rim of the container and the adjacent portions thereof are provided with an insulating coating of insulating lacquer or varnish, paraffine paper, collodion, compound mass or any other suitable material. According to a further modification the zinc electrode may be forced over the upper of lower rim of a ring of synthetic resin and tightly turned over.

The invention will be better understood by reference to the following detailed description in connection with the accompanying drawing showing by way of example and purely schematically two embodiments of the invention and in which:

Fig. 1 is an axial section through a dry cell having the invention applied thereto.

Fig. 2 is an axial section showing a modified form, and

Fig. 3 is a cross section of Fig. 2.

Similar characters of reference denote similar parts in the different figures.

Referring now to the drawing in greater detail, and first to Fig. 1, it will be seen that an outer cup or container B of insulating material has incorporated in its bottom wall a carbon electrode K which with a projection of reduced diameter extends through said bottom wall, the terminal T being in the form of a cap forced upon said projection, as usual. The container B is filled with the depolarizer mass D which has been pressed into the same. Another shallow container S of insulating material accommodates a zinc electrode Z engaging the bottom thereof, and the electrolyte paste P. A terminal wire A is soldered to the zinc electrode and passed through the bottom wall of the container S. The interior container S is firmly engaged with the depolarisator mass, in such a manner that its rim is impressed into the mass, and secured in this position by means of clamps H, or other suitable means, such as, lacing, cementing, or the like. In case of cementing, the interior container S is advantageously so dimensioned that

it fits into the outer container with a slight clearance only for entering the cement.

During the discharge of the element the electrolyte paste P is liquefied only in the interior of the container S, at the boundary layer between the electrolyte paste P and the zinc plate Z, while the non-diluted paste P owing to the expansion pressure produced as a result of its growing volume is forced to penetrate the depolarisator mass. This process is promoted by the fact that contemporaneously therewith at the portions of the mass D facing the zinc electrode, through dissolution of ammonium chloride crystals or other combinations, pores have been formed which can be filled up by the expanding electrolyte paste.

It will thus be seen that there is no chance for the paste P to escape through between the containers S and B, the more so as the depolarisator mass D is compressed additionally under the edges of the container S. Another advantage resides in the fact that the portion of the depolarisator surface not covered by the interior container S may serve for ventilating the depolarisator mass.

Referring now to the embodiment shown in Figs. 2 and 3, it will be seen that a central carbon rod K' is surrounded by the depolarisator mass D which need not be encased, while three sector-shaped shells S' containing the zinc electrodes Z' and the electrolyte paste P are held in tight engagement with the depolarisator mass D by means of laces L, by cementing, or by any other suitable means. Three terminal wires A' constitute the negative pole.

Where a plurality of flat elements are piled up in a series arrangement, it is not necessary for the interior shell of each element to be secured in position by clamps or similar means, but it will be sufficient to combine the assembled elements in the form of a block, for instance, by lacing, binding wire, and thus to fix the inner cups or shells.

The provision according to the present invention of a separate cup or shell for the electrolyte offers the advantage that the electrolyte paste can be poured into this shell for solidification and thus does not come into contact with the depolarisator mass in its soft state. Hitherto, on the contrary, the electrolyte was filled into the element in a non-thickened condition, with the result that the depolarisator layer already after a short time was extensively impregnated by the electrolyte. According to an important feature of the present invention, on the contrary, the electrolyte liquid admixed with thickening agents can be poured into the container provided therefor, and then converted into the gel state.

In order to produce elements of the atmospheric oxygen type the depolarisator electrode may contain active carbon and/or other oxygenous matter, such as, indigo white, cerium salts and the like. The advantages mentioned above of increased efficiency by encasing the electrolyte will always become apparent with surface depolarisation, also, for example, where depolarising agents like perborates or persulfates, such as, ammonium persulphate, or chlorides, such as, ferrichloride, are used.

The method and product of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

ERICH MARHENKEL.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. MARHENKEL
PRODUCTION OF GALVANIC DRY CELLS
Filed May 21, 1941

Serial No.
394,417

Fig.1

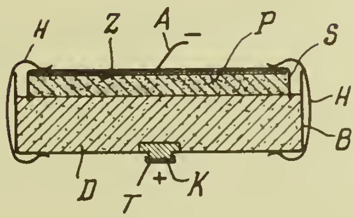


Fig. 2

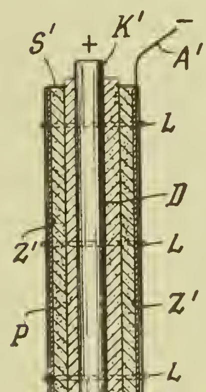
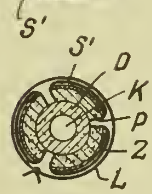


Fig.3



INVENTOR
Erich Marhenkel
By Wm. S. Pritchard
attorney.

Published May 11, 1943

Serial No. 395,118

ALIEN PROPERTY CUSTODIAN

BIPARTITE TUBE WITH TUBE BODY WOUND OF SEVERAL LAYERS AND CONTAINING AT LEAST ONE LAYER OF METAL FOIL

Werner Friedrichs, Berlin C 2, Germany; vested in the Alien Property Custodian

Application filed May 24, 1941

The invention relates to bipartite tubes, especially to tubes made from artificial substances, the body of said tubes being wound of several layers and containing at least one layer of metal foil.

For the production of such tubes it is usual to wind a band of varnished hydrate cellulose or the like onto a mandrel and to roll-in one or several layers of metal foil, especially aluminium foil covered with paper, in order to then connect the wound body thus produced and suitably glued together with a head piece made separately from plastic phenol, vinylester polymerisates or the like. The metal foil in the wound body serves practically only for packing and can therefore be called a "packing foil", whereas the other layers of the wound body are destined to take up the mechanical forces acting upon a tube when the same is in use, these layers being best called "carrier foils".

Tube bodies of this kind are generally rather stiff and can consequently not be pressed out and rolled up so easily as is desired. The chief reason herefor is the paper layer of the covered metal foil, which, however, up to the present could not be avoided for the reason that sufficiently thin, non-covered metal foils crumple too easily and consequently, on the one hand, when transparent foils are used, impair the appearance of the tube body, and independently thereon on the other hand in the winding machines, by the formation of folds which produce an askew running-in, cause permanently disturbances in the manufacturing proceeding and in the regular production.

These inconveniences are obviated by the invention, which thus makes it possible to use non-covered metal foil-inserts for the object in view. Owing to the invention a so-called "embossed foil" of known type is used as metallic packing insert, i. e. a foil into which a tight net of embossings is rolled which might be of any shape and have for instance the form of a single or crosswise fluting or the form of honey-combs, punching fields or the like. Such embossed foils make not only scarcely perceivable for the eye any crumpling which might occur, but they are inclined only very little to crumpling. They chiefly run always uniformly and without formation of folds into the winding machine for the reason that the embossings impart to them a certain yieldability, which enables the adaptation to the unavoidable differences in the wall thickness of the other foils. The other foils are mostly cast and show therefore quite irregularly, at points distributed like islands, a thickness exceeding or remaining below the average value. An especially good equalization in this respect is obtained, if the embossings are selected, for instance in the form of a cross net, so that they give to the foil an increased yieldability in both coordinates of its plane.

A further material advantage of the employment of embossed foils according to the invention consists in that these foils, owing to their increased yieldability, participate at the unavoidable working of the other parts of the wound body consisting of organic substances, much better in the movements of the same than simple smooth-rolled metal foils. This advantage is of particular importance for wound tube bodies, the carrier foil of which consists of hydrate-cellulose; as hydrate-cellulose very strongly shrinks, as is known, when loss of moisture occurs. For a tube of known type a few days of especially dry weather are sufficient to detach the sticking between the metallic packing foil and the shrinking carrier foil which correspondingly stretches, so that the wound body unfolds and sometimes even becomes leaky. This very serious inconvenience of the tubes of known type is securely avoided by the use of embossed metallic insert foils according to the invention.

When transparent carrier foils are used, which render visible from the outer side the metallic packing foil, it is possible to obtain, by suitable construction of the embossing pattern used according to the invention especially good effects acting like advertisements and which may be assisted thereby that the embossed metallic packing foil, prior to the rolling into the wound body, is coated with a colored covering—or transparent-lacquer or that the transparent carrier foil is colored.

In the accompanying drawing shows

Fig. 1 a tube made according to the invention and

Fig. 2 diagrammatically a strongly enlarged portion of a section on line *a*—*b*.

The tube head **1**, made of plastic phenol, vinylpolymerisates or the like, is stuck together in known mnner with a tube body **2** produced separately as wound body. The wound tube body **2** is built up of transparent hydrate-cellulose foil, between which a metal layer is enclosed which according to the invention is made of embossed metal foil. The embossings of this foil, which in the present instance have the form of a crossed embossing and naturally are visible through the hydrate-cellulose, are shown in Fig. 1 diagrammatically, i. e. without consideration of the perspective distortions as fine net of crossed lines.

As shown in Fig. 2, the thin embossed metal foil **7** is enclosed between the hydrate cellulose layers **3**, **4**, **5** and **6** indicated by oblique hatching. The sticking zones are indicated by radial hatching, and it is clear that the metal foil **7**, alternately connected with the layers **4** and **5** of the carrier foils, can yield in peripheric direction also to strong working of the corrier foils **3** to **6** without detaching from the foils **4** and **5**.

WERNER FRIEDRICHS.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

W. FRIEDRICHS

BIPARTITE TUBE WITH TUBE BODY WOUND OF SEVERAL LAYERS AND CONTAINING AT LEAST ONE LAYER OF METAL FOIL

Filed May 24, 1941

Serial No. 395,118

Fig. 1

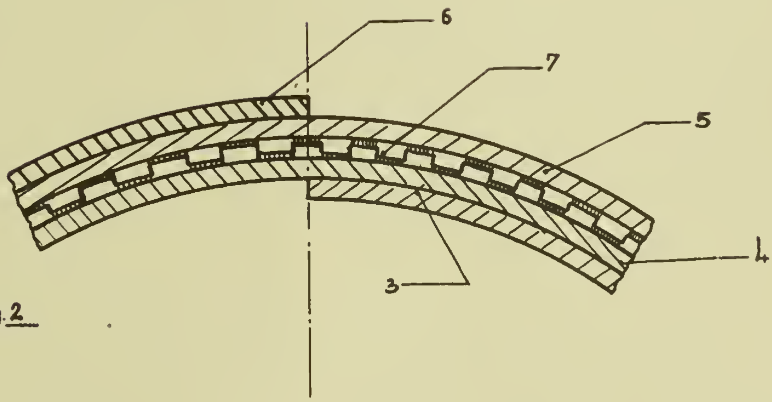


Fig. 2

Published May 11, 1943 Serial No. 395,364

ALIEN PROPERTY CUSTODIAN

METHOD FOR PRODUCING OPTICAL GLASSES

Edwin Berger and Otto Freundel, Jena, Germany; vested in the Alien Property Custodian

No Drawing. Application filed May 27, 1941

In ordinary optical crown and flint glasses the relation between the refractive index n_d and the mean dispersion n_F-n_C is such that the relation $n_d \geqq 13.815\ (n_F-n_C+0.1)$ applies for glasses having a refractive index smaller than 1.65 and the relation $n_d \geqq 11.7\ (n_F-n_C+0.1216$ for glasses having a refractive index greater than 1.65. While up to the present it has been possible already to produce glasses which relative to the mean dispersion showed a considerably higher refractive index than the minimum value indicated by the aforementioned relations, it did not appear possible but for some special type of fluorous alumoborosilicate glasses having a mean dispersion below 0.0073, also to inversely attain a noticeably lower refractive index.

According to the invention however, optical glasses having a mean dispersion below 0.0073 can be produced with a considerably lowered refractive index than heretofore while such optical glasses having a mean dispersion greater than 0.0073 can be produced to a large extent with a lowered refractive index if their content of fluorides as well as of aluminium oxide and titanium oxide is kept as large as possible, but their content of earth alkaline oxides and of boric acid anhydride as small as possible, admitting further large quantities only of alkalies, or lead oxide, if desired, or antimony oxide and arsenic oxide.

Of those substances which according to the invention are desirable to be introduced in largest possible quantities, fluorides, as alkali-fluoride, silico-fluoride, alumo-fluoride and others, have the highest reducing effect upon the refractive index relative to the dispersion. There is one difficulty when introducing fluorides, in that they evaporate differently depending upon the composition of the glass and upon the melting temperature. The behavior of highly alkaline glasses and of glasses with an abundancy of boric acid is a relatively favorable one, which presumably is in first place attributable to their low melting temperature. Also in these glasses, however, not much more than 70% at the most of the introduced fluor remain in solution. It being practically immaterial in what linked form the fluor is introduced, it will be advisable in calculating the batch to elect a preliminary batch free from fluorides to begin with and then in part replace the oxides contained therein by corresponding fluorides. In the following the equivalent replacement of x parts by weight oxygen by fluor is symbolically indicated by x% O/F. An example of a glass batch would accordingly read:

$$40\%\ SiO_2+20\%\ B_2O_3+10\%\ Al_2O_3+10\%\ Na_2O +10\%\ K_2O+10\%\ CaO\ (=100\%)+1\%\ O/F$$

According to the atomic weights 116.2 weight parts K_2F_2 would correspond, for example, to a quantity of 94.2 weight parts K_2O, of which 16 weight parts oxygen are equivalently replaced by 38 weight parts of fluor. In other words, 1% O/F means the replacement of

5.89% K_2O by 7.26 KF (potassium fluoride)
3.88% Na_2O by 5.25 NaF (sodium fluoride)
3.5% CaO by 4.87 CaF_2 (fluor spar)
1.94% Na_2O+1.06 Al_2O_3 by 4.38 Na_3AlF_6 (cryolite)
1.29% Na_2O+1.26 SiO_2 by 3.93 Na_2SiF_6 (sodium silico-fluoride)

Thus when using potassium fluoride or sodium

silicofluoride the following parts would have to be melted down:

SiO_2	40.0	38.74
B_2O_3	20.0	20.0
Al_2O_3	10.0	10.0
Na_2O	10.0	8.71
K_2O	4.11	10.0
CaO	10.0	10.0
KF	7.26	----
Na_2SiF_6	----	3.93
	101.37	101.38

One weight-part of oxygen being equivalently replaced by 2.375 weight-parts of fluor, an average would result of 1.375 weight-parts more than according to the preliminary batch. If the evaporation of the fluorides is thereby to be set out at, say, 30%, it will be necessary to introduce 1.43% O/F into the batch in order that the glass may contain 1% O/F.

On account of the fluorides segregating more or less easily during the annealing process, either in the form of crystals or in the form of milky liquid drops depending upon the composition of the glass, the fluorides cannot be introduced into the glass in any arbitrary quantities. Optical glass requiring a very slow annealing process, this segregating tendency is a particularly marked one in optical glasses. To counter this segregating tendency the initial batch which serves for melting the new glasses is expediently made to contain from 5% to 30% of alkali oxide, at least half consisting of potassium oxide, owing to sodium oxide and lithium oxide having but little effect on the diminution of the refractive index relative to the dispersion. The introduction also of boric acid anhydride and aluminium oxide is adapted to counteract said segregating tendency. The introduction of titanium oxide is of the same effect although practically, there is a limit for the content of titanium oxide near approximately 30%, as otherwise a brown tint detrimental to optical glass becomes markedly noticeable in addition to crystallization and turbidity. For this reason it is expedient that the initial batch contain boric acid anhydride, aluminium oxide and titanium oxide to an extent of altogether at least 5%, but not more than 45%, whereby the sum total of boric acid anhydride and aluminium oxide should not exceed 40%. The brown tint becoming particularly noticeable when there is a large content of aluminium oxide the latter must not exceed that of boric acid anhydride more especially so the higher the content of titanium oxide may be. In the same manner also the content of antimony oxide and arsenic oxide must be kept low when the content of titanium oxide is high as they likewise promote brown tinting to a considerable extent. In the event of the content of titanium oxide amounting to 10% or more, provisions should suitably be made for the content of antimony oxide and arsenic oxide to amount together to not more than 10% at the most.

Also, in the presence of titanium oxide in fluorous melts, earth alkaline oxides lead to the formation of turbidities. Their content should for this reason be as low as possible and by no means exceed 5% of the initial batch. Also bivalent metal oxides should be avoided, if possible, as they promote the tendency of segregation and are antagonistical to the lowering of the refractive index. Of these oxides, the behaviour of lead oxide may yet be considered as the most favorable in both respects. In fact, if glasses are to be produced having a high mean dispersion and a lowered refractive index relative to the dispersion the introduction of lead oxide besides antimony and arsenic oxides is even recommended in order to avoid the occurrence of a brown tint despite the glasses containing great quantities of titanium oxide. The rise occasioned thereby in the refractive index can be partly counteracted by diminishing the content of boric acid.

The general rules governing the production according to the invention of optical glasses having a lowered refractive index relative to the dispersion are applicable in various ways depending upon the region in which the optical glasses lie. The first region is that where the mean dispersion is lower than 0.0073; the second, where the mean dispersion amounts to at least 0.0073 and where the refractive index is maximally 1.65; the third region being, where the refractive index is higher than 1.65.

The following applies within the first region: Pure alkali-silicate-fluoride glasses segregate crystals when the content of fluor is low and turbidities when the content of fluor is high, the extent of both defects increasing the lower the alkali content may be. Potassium glasses react more favorable in this respect than sodium or lithium glasses. By introducing boric acid anhydride and aluminium oxide the segregating tendency can be sufficiently suppressed, as pointed out before, so that substantial quantities of oxygen can be replaced by flour without thereby impairing the production of glasses which are free from crystals and turbidities. The known type of fluor-alumo-borosilicate glasses composed in accordance with the above correspond to a preliminary batch containing 5% to 25% alkali oxide and 15% to 35% boric acid anhydride and aluminium oxide in total, whereby the content of boric acid anhydride is always greater than that of aluminium oxide, the replacement of the oxygen being about 4% O/F. They have a mean dispersion under 0.0073 and a diminution of the refractive index by maximally 0.017 under the magnitude 13.815 $(n_F-n_C+0.1)$. However, the investigations on which the invention bases have shown that boric acid anhydride weakens the refraction-diminishing effect of the fluorides to a greater or lesser extent, whilst aluminium oxide increases that effect, thus leading to greater diminutions of the refractive index. It must be noted however that the effect of the boric acid anhydride, and also but to a lesser extent that of the aluminium oxide, is not additive, but is dependent upon the introduced quantity. In the case of the content being low the boric acid anhydride substantially weakens the refraction-diminishing effect of the fluorides, while in the case of greater contents of from say, about 10% on the initial batch, the effect for the same increases. However, if the amount of aluminium oxide exceeds that of boric acid anhydride the same increase in boric acid anhydride is capable even to enhance the said effect. In addition to that the quantity of fluoride may then be increased up to and above 4% O/F, thus making it possible to raise the diminution of the refractive index to more than 0.018 if the content taken of aluminium oxide is the same at least as that of the boric acid anhydride and the sum of both of them is made to amount from 10% to 45%. The desired diminution of the refractive index can be achieved and the tendency towards seg-

regation and crystallization, also with high contents of fluoride, avoided if the initial batch of silicon dioxide, boric acid anhydride, aluminium oxide, and alkali oxides is made to amount to at least 95% in total, i. e. if the content of the other substances is kept at a low level.

If it is intended to arrive in the second of the aforementioned regions and for this purpose increase to more than 0.0073 the mean dispersion of the fluor glasses by introducing earth alkaline or bivalent metal oxides, small contents of such additions already suffice to bring about a turbidity-forming tendency. Though this tendency clearly falls off in the order BeO, MgO, CaO, SrO, BaO, ZnO, CdO, PbO, it is still strong enough, even at PbO, to call for a reduction in the content of fluor in order to obtain glasses free from turbidity, the reduction in question having to be carried to an extent which prevents the attainment of the desired diminution of the refractive index as a result of the refraction-diminishing effect of the fluorides being counteracted both, by the effect of the boric acid anhydride which weakens that property and also by the effect of the bivalent oxides themselves. However, according to the invention, the introduction of antimony oxide is adapted to increase the mean dispersion above 0.0073 and to produce glasses which, relative to the dispersion, have a lowered refractive index. Antimony itself, though acting in a somewhat opposite sense even if it be noticeably less so than boric acid anhydride or bivalent oxides, it does not by far to the same extent as the bivalent oxides lead to crystallization and turbidity in the presence of fluor. With the segregating tendency being equal, the fluorides and aluminium oxide can be incorporated to an appreciably higher extent even when substantial quantities of antimony oxide are present. In view of the fact however that, practically, the aforesaid modifications of fluoro-alumo-borosilicate glasses are bound to go at the expense of the content of silica, the glasses obtained in this manner will have a lower chemical resistivity, particularly a greater acid-solubility, and a greater swelling capacity if exposed to water. Micro-fissures easily occur when the polished surfaces of such glasses dry out. Another reason why greater contents of antimony oxide should be avoided is that they give rise to optically detrimental tints of yellow or brown color. The behaviour of arsenic oxide is similar to that of antimony oxide.

It has been shown however that by introducing quantities of at least 0.2% of titanium oxide jointly with or in place of antimony oxide these difficulties can be done away with to a great extent and that such an introduction is of a particular advantage in that titanium oxide, even if applied in small quantities, increases the mean dispersion to a considerable degree, while at the same time entailing a diminution in the refractive index relative to the dispersion and minimizing the acid-solubility and swelling capacity.

Also boric acid anhydride and aluminium oxide should expediently be contained in the glasses, whereby the quantity of aluminium oxide is to amount to at least as much as the boric acid anhydride. In doing so it will be of advantage to so choose the batch that the glasses contain in total at least just as much aluminium oxide, titanium oxide, antimony oxide and arsenic oxide, as their total content of boric acid anhydride and possible earth alkali oxides.

The effect of the fluor, as expressed in % O/F, upon the diminution of the refractive index corresponding on the average to about five times the opposite effect of boric acid, the weight-parts of oxygen equivalently replaced by fluor should amount to at least one fifth of the content of the total of boric acid anhydride and earth alkali oxides of the initial batch.

In order to produce glasses within the third of the aforementioned regions, i. e., glasses having a refractive index higher than 1.65, the sum of the numbers of the percentage of antimony oxide, arsenic oxide, lead oxide and other bivalent oxides augmented by double the number of the percentage of titanium oxide must amount to more than 50 in the initial batch of the glasses according to the invention. To lower the refractive index relative to the dispersion, it will be expedient to introduce titanium oxide in quantities of from 0.2% to 30%. Tetravalent oxides other than titanium oxides, as well as pentavalent and hexavalent metal oxides appear to diminish rather than like titanium oxide clearly augment the diminution of the refractive index relative to the dispersion. The content of aluminium oxide, titanium oxide and of those oxides of antimony and arsenic, which in total have no practical influence on the diminution of the refractive index, expediently should be at least equal to that of boric acid anhydride and earth alkalies together. Since high contents of titanium oxide give rise to brown tints and turbidities it will be advisable to produce highly refracting glasses by the introduction of lead oxide which, of all bivalent oxides, raises the refractive number relative to dispersion to the least extent. Owing to their content of lead oxide and other bivalent oxides and in spite of a low content of boric acid anhydride and of the introduction of fluor in quantities of more than 0.1% O/F, glasses of this kind show only small diminutions in the refractive index, though it is true that in this region even a slight diminution is practically of greatest significance for achieving novel optical designs.

In the annexed table glass compositions are listed for a number of glasses producable by the new method, including the optical data of said glasses. The components of the preliminary batch are given as oxides, though there is nothing in the way of introducing the corresponding quantities of raw materials in another form. Thus, it is possible, for instance, to take crystallized boric acid (B_3HO_3) in place of boric acid anhydride (B_2O_3) and calcined soda (N_2CO_3) in place of soda (Na_2O).

As can be gathered from the optical data the glasses 1 to 14 ($n_F-n_C<0.0073$) belong to the first of the aforementioned regions, the glasses 15 to 34 ($n_F-n_C\geqq0.0073$; $n_d\leqq1.65$) to the second region, and the glasses 35 to 41 ($n_d>1.65$) to the third region. The value a given in the last column is the amount by which the refractive number n_d has been lowered relative to the lowest refractive index occasioned in ordinary optical glasses of the same mean dispersion. As stated in the aforegoing, for a refractive index lower than 1.65, (i. e., for the first and second region) the lowest value is obtained by the formula $n_d=13.815\ (n_F-n_C+0.1)$ for ordinary optical glasses, while for a refractive index higher than 1.65 (i. e., for the third region) the lowest value results from the equation

$$n_d=11.7(n_F-n_C+0.1216).$$

In other words, if for the glass 1 the value a

is given as 0.0280, for the refractive index $n_d=1.4443$ the equation holds good

$$n_d=13.815(n_F-n_C+0.1)-0.0280.$$

For the glass 35 the value $a=0.039$ accordingly means that $n_d=11.7(n_F-n_C+0.1216)-0.039.$

	SiO_2	B_2O_3	Al_2O_3	Na_2O	K_2O	PbO	Sb_2O_3	As_2O_3	TiO_2		O/F	n_d	ν	n_C-n_F	a
1	47,1	13,5	20,3	-----	19,1	-----	-----	-----	-----	-----	8,3	1,4443	67,6	0,00657	0,0280
2	41,7	18,0	20,0	-----	20,0	-----	-----	0,3	-----	-----	8,0	1,4380	67,7	0647	329
3	46,2	13,5	21,0	-----	19,0	-----	-----	0,3	-----	-----	8,0	1,4395	67,5	0651	319
4	37,5	20,0	20,0	-----	20,0	-----	-----	-----	-----	2,5 BaO	8,0	1,4484	67,4	0665	250
5	37,5	20,0	20,0	-----	20,0	2,5	-----	-----	-----	-----	8,0	1,4465	66,0	0676	284
6	37,5	20,0	20,0	-----	20,0	-----	2,5	-----	-----	-----	8,0	1,4469	65,2	0685	292
7	35,0	20,0	20,0	-----	20,0	-----	5,0	-----	-----	-----	8,0	1,4507	63,2	0713	293
8	45,0	10,0	20,0	-----	20,0	-----	5,0	-----	-----	-----	8,0	1,4454	64,8	0687	310
9	37,5	20,0	20,0	-----	20,0	-----	-----	-----	-----	2,5 GeO_2	8,0	1,4402	66,6	0661	326
10	37,5	20,0	20,0	-----	20,0	-----	-----	-----	-----	2,5 P_2O_5	8,0	1,4483	67,6	0663	248
11	37,5	20,0	20,0	-----	20,0	-----	-----	-----	-----	2,5 WO_3	8,0	1,4459	65,8	0678	293
12	41,7	15,0	20,0	-----	20,0	-----	-----	0,3	-----	3,0 Tl_2O_3	6,0	1,4470	67,0	0667	267
13	37,5	20,0	20,0	-----	20,0	-----	-----	2,5	-----	-----	8,0	1,4454	65,8	0677	296
14	45,0	15,0	20,0	2,5	17,5	-----	-----	-----	-----	-----	6,0	1,4516	66,1	0683	243
15	30,0	15,0	15,0	-----	20,0	-----	20,0	-----	-----	-----	8,0	1,5000	52,9	0945	121
16	15,0	15,0	20,0	-----	20,0	-----	30,0	-----	-----	-----	12,0	1,5037	46,4	1085	277
17	20,0	25,0	15,0	-----	20,0	-----	20,0	-----	-----	-----	8,0	1,5032	51,4	0979	131
18	34,7	12,0	22,0	2,0	16,0	-----	13,0	0,3	-----	-----	3,5	1,4939	54,8	0902	122
19	35,7	12,0	22,0	-----	18,0	-----	9,0	0,3	-----	3,0 CdO	4,0	1,4837	57,3	0844	144
20	29,7	15,0	25,0	-----	20,0	-----	10,0	0,3	-----	-----	4,0	1,4991	56,8	0878	037
21	25,0	15,0	20,0	-----	20,0	-----	15,0	5,0	-----	-----	8,0	1,4772	56,5	0844	209
22	25,0	15,0	20,0	-----	20,0	-----	15,0	5,0	-----	-----	6,0	1,4902	54,1	0906	165
23	26,7	18,0	25,0	-----	20,0	-----	10,0	0,3	-----	-----	8,0	1,4583	61,3	0748	265
24	69,7	-----	-----	-----	20,0	-----	-----	0,3	10,0	-----	2,0	1,5287	48,0	1101	049
25	49,7	15,0	5,0	-----	20,0	-----	-----	0,3	10,0	-----	4,0	1,5253	47,4	1108	093
26	49,5	10,0	10,0	-----	20,0	-----	-----	0,5	10,0	-----	4,0	1,5214	45,5	1146	184
27	54,1	7,9	8,5	-----	20,0	1,2	-----	0,5	7,8	-----	4,0	1,51281	50,5	1015	089
28	51,6	7,9	8,5	-----	20,0	1,2	-----	0,5	10,3	-----	3,0	1,53358	46,0	1160	082
29	49,2	8,0	9,0	-----	23,0	-----	-----	0,5	10,0	-----	3,0	1,5269	48,1	1095	059
30	49,5	-----	5,0	-----	20,0	-----	-----	0,5	25,0	-----	2,0	1,6142	32,9	1867	252
31	51,9	7,9	8,5	-----	20,0	1,2	-----	0,5	10,0	-----	10,0	1,50794	46,1	1101	257
32	49,8	10,0	8,5	-----	20,0	1,2	-----	0,5	10,0	-----	10,0	1,51348	45,7	1123	260
33	47,5	10,0	10,0	2,0	18,0	-----	3,0	2,0	5,0	2,5 BaO	3,0	1,5106	54,1	0943	012
34	37,9	-----	-----	-----	11,6	40,0	-----	0,5	10,0	-----	4,0	1,64176	32,6	1966	113
35	37,2	-----	1,5	1,0	6,5	48,3	-----	0,5	5,0	-----	1,0	1,67756	31,2	2171	039
36	39,5	-----	5,0	-----	15,0	20,0	-----	0,5	20,0	-----	2,0	1,65378	30,9	2115	199
37	33,5	-----	5,0	-----	15,0	30,0	5,0	1,5	10,0	-----	2,0	1,66375	31,2	2126	115
38	37,9	-----	-----	-----	11,6	40,0	-----	0,5	10,0	-----	2,0	1,67770	30,5	2220	105
39	37,0	-----	-----	1,5	6,0	50,0	-----	0,5	5,0	-----	1,0	1,6942	28,9	2400	189
40	34,5	-----	2,5	1,5	6,0	50,0	-----	0,5	5,0	-----	2,0	1,6686	31,3	2135	079
41	31,8	-----	2,5	1,5	8,7	50,0	-----	0,5	5,0	-----	4,0	1,66950	31,6	2122	052

EDWIN BERGER.
OTTO FREUNDEL.

Published May 11, 1943 Serial No. 395,459

ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF COATED PIPES

Heinrich Klas, Düsseldorf, Germany; vested in the Alien Property Custodian

No Drawing. Application filed May 27, 1941

This invention relates to manufacture of coated pipes; and it comprises a process wherein the inside of a metal pipe is coated with an artificial resin of the phenol-formaldehyde type by introducing into the pipe a fluent mixture containing a solvent-free resin of this type, an inert filler and a hardening agent, the hardening agent being advantageously mixed with the resin just prior to the introduction of the mixture into said pipe, the pipe being rotated rapidly on its axis to uniformly distribute the resin mixture on the inner wall, rotation being continued until said resin solidifies on the pipe wall, the temperature of the pipe being advantageously maintained at a temperature not substantially exceeding room temperature and the quantity of resin applied being at least about 0.8 kilogram per square meter, producing a minimum coating thickness of 0.5 mm., the inner wall of the pipe being precoated, if desired, with a ground coat of benzyl cellulose with or without the admixture of a pigment; all as more fully hereinafter set forth and as claimed.

Pipes, made of different materials and according to different processes, are used extensively for conducting hot liquids, such as hot water. The choice of the kind of pipe to be used depends upon the chemical and mechanical properties of the material to be conducted. Iron pipes, unprotected or galvanized can only be use for liquids which do not attack iron. However, it is known that liquids which do not attack iron in the cold state can assume aggressive properties on being heated. Consequently, most domestic hot waters must be regarded as having aggressive properties, which becomes apparent by the signs of destruction, such as the formation of rust, reduction in cross sectional area, pitting and incrustation. This is the case to an increased extent with hot water derived from condensation, such as collects in condensation conduits. Boiling water can also cause damage. A technically satisfactory solution has hitherto been found by using copper pipes in such cases. It is however desirable and even necessary in many cases to refrain from using copper tubes; the same applies to tinned pipes. Lead pipes must likewise be avoided, and furthermore no satisfactory result is attained therewith for hygienic and technical reasons.

It has been proposed, to protect iron against the action in question by coating. The well known fire galvanizing has not led to any satisfactory result. Pitting and incrustation cannot be permanently prevented thereby. Other metal coatings such as chromium, cannot come into question as they are electropositive to iron and accelerate corrosion at damaged and defective points. The employment of double pipes, for example copper inside and steel outside, also presents technical difficulties in the production and machining.

Hitherto the employment of non-metallic coatings has likewise met with little success. Enameling or glazing has been proposed but the process is complicated, expensive and unsatisfactory from a technical point of view. It must be borne in mind that, in long and sometimes thin pipes, for example 10 meters in length and down to 10 millimeters in diameter, quite different drying conditions prevail in the middle than at the ends, as in the middle the air is always saturated with water vapor, which considerably retards the drying. For this reason the coatings are irregular and insufficiently dense at certain points. Repeated application is almost impossible, for example in the case of enameling. The same difficulty arises to an even greater extent with lacquers and the like, that is with substances which dry physically by separating out solvents. The removal of the solvent entails considerable difficulties. Furthermore all lacquers hitherto placed on the market became unstable in the course of time. The same applies to coats produced using drying oils.

Attention must always be paid to the special conditions in the pipe. There can be no question of renewing the coating.

In the case of cold water good results have been obtained with bituminous substances. These substances, however, fail at higher water temperatures.

No proposal has as yet given satisfactory results, so that at present the hot water is treated, for example by adding sodium sulfite for binding the oxygen or by the addition of sodium phosphate and the like, and black iron pipes are used. Although these methods are good, yet they are expensive and complicated so that a perfect protection for iron pipes is very seriously desired.

The present invention solves the problem in technical and economical respect. According to the present invention resistant coatings are applied which take into consideration the particular conditions in the pipe and which are applied by an advantageous method. The substances employed according to the invention are stable. The formation of the protective film is based on chemical reactions and is not dependent on the removal of solvents for the film forming substance. It is possible by means of these sub-

stances to apply in a single operation layers of sufficient thickness. Liquid, solvent-free artificial resins serve as a basis for the coating materials which are used in the method according to the present invention, said artificial resins being phenol-aldehyde resins formed from phenols, such as phenol itself, meta- or para- cresol and the like, and from aldehydes, such as formaldehyde, paraformaldehyde and the like, in known manner.

In one process within the scope of this invention, which represents a practical embodiment thereof, a soluble, fusible liquid resin is produced in known manner from a phenol, such as metracresol, and formaldehyde. A known softening agent such as tricresylphosphate can be added to this liquid resin in a quantity of 5 to 35 per cent, if desired. The liquid artificial resin is now mixed with an inorganic filling material, such as finely ground quartz dust, whereupon a few percent of a hardening agent, such as paratoluene sulfochloride or toluene sulphochloramide, is added. This hardening agent may also be added in known manner to the filling material. The resulting mass is stirred to a paste with distinctly fluid properties and employed in this condition. The hardening of the coating is effected by the condensation between the phenol employed and the formaldehyde. It has been found, that extraordinarily stable and rapidly hardening and comparatively thick protective layers can be produced in this manner.

The fluent coating mass may be filled in an excess amount from one side into a pipe to be coated and distributed on the inside wall, the excess flowing out through a suitably shaped stopper. The amount remaining in the pipe results from the difference between the inside diameter of the pipe and the inner diameter of the stopper. The stopper is preferably so proportioned that about 2.5 kilograms of the coating mass can be applied per square meter, the result being a layer thickness of about 1.5 millimeters after the hardening.

The mass which is thus introduced and distributed in the pipe is uniformly further distributed on the inner wall of the pipe by a rapid rotation thereof. This rotation of the pipe is maintained until the mass has become at least partly set, that is to say, so that it no longer runs off under the action of gravity, a result which, if desired can be accelerated by heating the pipe. The final hardening takes place in the course of time and can also be accelerated by heating.

The said amount of 2.5 kilograms per square meter of coating mass is only given by way of example. If necessary smaller or larger amounts may be applied but with the restriction that the minimum amount required to produce satisfactory results is about 0.8 kilograms per square meter with a layer thickness of 0.5 millimeters, this thickness being critical.

Before the protective mass is filled in the pipes, the pipes can be provided with a known priming coat of benzyl cellulose, with or without pigment addition for better adhesion. This priming coat may be applied by coating, filling and allowing the excess to flow out or by immersion. It is not necessary that the first coat be absolutely resistant to hot water.

Pipes made according to the method of the present invention are resistant to hot and to boiling water and the coating is even sufficiently steam proof. They also show high resistance to hot water in which acids, bases and salts are dissolved.

While I have described what I consider to be the best embodiments of my process, it is evident that many modifications can be made in the specific procedures described without departing from the purview of this invention. The resins used can be prepared using either aqueous formaldehyde or by the so-called "dry-process". For example, any of the known phenol-aldehyde artificial resins can be used in my coating process, provided these resins, when mixed with an inert filler and hardening agent, are capable of withstanding hot water and steam. The filler to be employed must be inert towards the resin and towards water; it must be non-hygroscopic and dense rather than porous. Any of the usual inert inorganic fillers, such as asbestos, quartz, pumice, emery, etc., in finely divided form, are suitable. And any of the known hardening agents can be employed which are capable of producing hardening of the phenol-aldehyde resin within a reasonable short time in the absence of solvents. The coating procedure can be varied in accordance with the length and size of the pipe to be coated. With large pipes brushing procedures are practical but with smaller pipes it is usually best to flush the resin into the pipe in excess and then to permit or cause the excess to drain off before or during the rotating step. If necessary a double coating can be used to produce the minimum thickness of 0.5 mm. required to produce satisfactory results.

HEINRICH KLAS.

Published May 11, 1943

Serial No. 395,485

ALIEN PROPERTY CUSTODIAN

THERAPEUTICAL USES OF ORGANIC PEROXIDES

Henri Achille Etienne Porsin, Paris, France; vested in the Alien Property Custodian

No Drawing. Application filed May 27, 1941

Hydrogen peroxide is one of the oldest antiseptics and of most widespread use in the medical profession. It appears a priori to be the ideal biological antiseptic because of its low toxicity, the substances resulting from its disintegration being water and oxygen, and it is now a matter of common knowledge that it originates in the course of the normal processes of cellular oxidation. Furthermore, the germ-killing activity of hydrogen peroxide is interesting and affects particularly the anaerobe germs, both perfect and imperfect.

This therapeutical activity, however, is hindered by the wellknown fact that hydrogen peroxide rapidly disintegrates into oxygen and water as soon as contacted with living tissues, with the result that its antiseptic activity is short-lived and cannot be used with the profit which might well have been expected from such a composition.

This explains why chemists have thought it advisable to turn their activity upon the class of mineral peroxides (magnesium peroxides, persulphates, perchlorates, etc) which, thanks to their very composition, are not subjected to the action of tissue catalases which destroy hydrogen peroxide. Such peroxides, however, are not biological like H_2O_2 and are consequently impervious to the activating properties of the tissue diastases known as "peroxidases." In other words, their local action on tissues is poor, and their only advantage is their germ-killing power.

I have discovered that by substituting in the formula of hydrogen peroxide (HOOH) one or two hydrogen atoms by an hydrocarbon organic group, one gets compounds which are proof against the action of catalases; thus giving the body the entire profit of the oxygen freed by those combinations.

My experiments bore on the group of alcoyl, oxyalcoyl and aldehydes peroxides answering the general formula ROOH, ROOR′ and ROO in which R and R′ may be hydrocarbon chains including or not an hydroxyl group HO.

The first terms of this series are represented by the formulae: CH_3OOH, CH_3OOCH_3, $OHCH_2OOH$, $OHCH_2OOCH_2OH$.

We have hitherto used to best effect ethyl hydroperoxide (C_2H_5OOH) which is easy to prepare and of low toxicity.

I have ascertained in the course of my experiments:

(1) That hydrogen peroxide thus attached to a radical, and practically unaffected by tissues, is endowed with lasting properties of local antisepsis.

(2) That its germicidal effect is intensified by alcoyl combinations.

(3) That such products, besides their external antiseptic action, acquire the remarkable property of acting directly upon the intermediate metabolism, i. e. by fixing themselves on blood pigmentation or other substances derived from haematin, take part in physiological combustions and intensify them.

(4) They are directly and totally used by the body and transformed into active oxygen, water and carbon dioxide, which settles the question of elimination by the natural exists.

I claim to be the first to have discovered that those substances can be used with profit in man or animal therapeutics, as after clinical experiments and above propositions. Therapeutical directions can be divided into two groups according to the mode of administration.

(1) Alcoyl, oxyalcoyl and aldehydes peroxides, and particularly ethyl hydroperoxide, suitably diluted in a vehicle, usually water, can be used in the same cases for which hydrogen peroxide is prescribed, with the advantage of a much more lasting action thanks to their remaining unaltered when in contact with tissues (treatment of sores and all external suppurations and inflammations).

(2) Introduced into the body either "per os" or intravenous injection, those substances add to their antiseptic properties that of joining the cycle of biological oxidations, i. e. through their combination with haemoglobine, they allow direct oxidation of a large number of substances carried through the economy and particularly of toxical or microbial waste products weighing upon blood circulation during infectious diseases.

Those substances can therefore be used with profit in numerous cases: in the case of infectious diseases not only against the pathogenous agent itself but also against toxins (intestinal infections, septicaemia, etc.) and toxic products of cellular disintegration.

In sort, alcoyl, oxyalcoyl and aldehydes peroxides have properties of both external and internal character and should be prescribed:

(*a*) As biological antiseptics.

(*b*) As "de-toxicating" agents, i. e. allowing direct action against excess in humours, of metabolites resulting from cellular disintegration or microbial infection.

HENRI ACHILLE ETIENNE PORSIN.

Published May 11, 1943 Serial No. 395,760

ALIEN PROPERTY CUSTODIAN

TREATMENT OF TISSUE WITH THERAPEUTICALLY ACTIVE RAYS

Erwin Schopper, Dessau, and John Eggert, Leipzig, Germany; vested in the Alien Property Custodian

No Drawing. Application filed May 29, 1941

Our present invention relates to an improved method for treating tissue and the like particularly of the human body with therapeutically active rays.

It is known in therapeutics to use material rays such as α-rays and protons besides the X- and γ-rays. The therapeutical effect of those particles is very intensive owing to the short ranges of the radiations in the tissues of the body. As the particles have a low penetrating power, they are generally employed only for treating surfaces. It has, therefore, already been proposed to use neutrons in the penetrating therapy since these corpuscular rays when having a suitable speed are capable of penetrating the tissue and producing protons therein especially due to a reciprocal action on hydrogen atoms or effecting conversions in the nucleus with other atoms whereby therapeutically active α-particles, protons and/or γ-rays are emitted.

It is often necessary in the radiation therapy to impart topical effects to parts in the interior of the body to be treated with rays, for instance crossed fields are used, i. e. there is carried out a radiation with several thin bundles of rays emanating from different sides and meeting at the place to be affected. In using γ-rays it is often possible to bring the preparation producing γ-rays in the form of so-called needles or small tubings to the place to be exposed to rays of the tissue and thus to obtain an intensive topical effect of the rays.

The neutrons have properties somewhat different from those of the γ-rays as to absorption and scattering. Rapidly moving neutrons (energy>0.1 *e*MV) obtained by disruption or bombardment with ions or radioactice radiation of beryllium or boron, for instance, have a very great penetrating power. In addition to a slight absorption the neutrons are scattered in the tissues of the body, the scattering being effected to a relatively large extent in substances having atoms of low weight, especially hydrogen atoms. A bundle of neutrons penetrating the body, therefore, becomes strongly diffuse. Accordingly the known method using crossed fields does not produce the desired effect in this case.

Due to the scattering the neutrons undergo loss of energy, i. e. the velocity thereof is decreased. Slowly moving neutrons, however, have only a relatively low penetrating power. As is known, such neutrons when having certain velocities are extremely strongly absorbed by certain substances such as lithium, boron, gadolinium, cadmium, dysprosium, indium, rhodium, iridium, gold, silver, mercury or rhenium. By this absorption there is attained a conversion of the atom nuclei, lithium emitting α-particles, boron emitting α-particles and protons and the other substances mentioned above forming in addition to a γ-radiation radioactive disintegration products which emit electrons.

In accordance with our present invention a way for obtaining a higher topical neutron effect is as follows:

The velocity of the neutrons emanating from a source of neutrons as, for instance, a mixture of 10 g of beryllium and 0.5 mg of radium on a neutron tube is decreased by a layer containing hydrogen as, for instance, paraffin or water and having a suitable thickness (paraffin: 8 to 10 cm; water: a correspondingly thicker layer) determined on account of the co-agency of the penetrated tissue. Thus a great percentage of neutrons with a suitable low velocity (for instance 3 to 7 *e*MV; 25,000 neutrons/second) is obtained. These slow moving neutrons, especially adapted to act upon the substances mentioned above such as boron, cadmium or silver are caused to be absorbed by one of these substances, if desired, in the form of a chemical compound or by a mixture of alloy thereof in order to produce therapeutically active particles and γ-rays. The substances are brought in needles or small tubings into contact with the tissue to be exposed to the rays. Sometimes it is to be preferred to employ the absorbing substance in the form of an aqueous solution. An innoxious, if desired, colloidal solution of a boron or lithium salt may, for instance, be used for exposing to rays the inner coat of the stomach. The effect thus obtained is especially insensitive since the particles produced by the neutrons are capable of penetrating the tissue only few thousandths of a mm.

ERWIN SCHOPPER.
JOHN EGGERT.

Published May 11, 1943

Serial No. 395,884

ALIEN PROPERTY CUSTODIAN

CASINGS FOR INTERNAL COMBUSTION ENGINES

Eugen Stump, Friedrichshafen, Bodensee, Germany; vested in the Alien Property Custodian

Application filed May 29, 1941

My invention relates to casings of internal combustion engines, especially engines of this kind as they are used in motor cars. Usually such casings are divided into an upper and a lower portion, the horizontal dividing plane going approximately through the axis of the crank shaft. With engines in which the casing is under heavy strain the dividing plane is situated lower and nearer to the bottom of the casing, so that the upper portion because of its greater height is able to endure greater forces because of the larger and more favourable cross section extending over the length of the engine. The rigidity and stiffness of the casing is thus increased so that its walls need not be so thick. This is of special importance with engines in which the cylinders are arranged in one row.

But this kind of construction of the casing involves difficulties with regard to its lower portion because of the usually prevailing narrow space underneath the engine, especially in motor cars, motor boats and other vehicles driven by internal combustion engines. The lower portion must then be made flat with a horizontal bottom in which it is practically impossible to arrange a lower situated oil sump so that the oil will be running about and sprayed around whenever the vehicle undergoes longitudinal inclinations, which makes it necessary to provide at least two oil pumps.

According to my invention, these disadvantages are avoided by the lower casing portion having a longitudinally inclined bottom which extends partially upwards over the horizontal dividing plane into the space confined by the upper casing portion. I prefer to make use of this upwardly extending bottom portion of the lower casing portion for the purpose of journaling the oil pump drive thereof.

My invention makes it possible to have high side walls in the upper casing portion and to create a single convenient oil sump in the lower portion without increasing the total height of the entire casing.

Having given a general description of my invention I now want to point it out more in detail having reference to the drawings which represent two examples embodying my invention.

Fig. 1 is a side view of a motor, partly in section.

Fig. 2 is a portion of a longitudinal section through a motor with a differently shaped lower casing portion.

In Fig. 1 the upper portion of the casing is designated by the numeral 1; it has high side walls extending over the entire length of the motor which has cylinders arranged in a row, the casing being indicated at 8 to which belongs the cover 11. The side walls of the upper casing portion 1 carry the bridges or brackets 5 in which the crank shaft 6 is journaled. The pistons 10 slide along the sliding surfaces 9. The upper casing portion extends upward to horizontal plane 2 and downward to horizontal plane 3 in which it meets the lower casing portion 12. This latter portion has the inclined bottom 13 which at its left extends upwards over plane 3 and at its right below this plane. At its right hand end the bottom 13 is shaped into an oil sump 23 provided with a pump 22 driven by vertical shaft 21, bevel wheels 20/19, horizontal shaft 16 and pinions 17 and 18. The horizontal shaft 16 is journaled at 15 in the upwardly extending left hand portion of the bottom 13 of the lower casing portion 12.

In the example represented in Fig. 2 like parts are designated by like numerals as in Fig. 1. What is different is that the lower casing portion 30 is provided with a bottom having two portions 31 and 32 inclined towards one another and meeting in the oil sump 33 over which the oil pump 34 is situated adapted to be driven by shaft 35. In this example only the left hand bottom portion 31 extends upwardly higher than the dividing plane 3 whereas the right hand bottom portion 32 extends approximately up to this plane 3. But of course, if so desired, the bottom portion 32 may also extend higher upward into the space confined by the side walls of the upper casing portion 1.

I do not want to be limited to the details described or shown in the drawings as many variations will occur to those skilled in the art without deviating from the scope of my invention.

EUGEN STUMP.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. STUMP

CASINGS FOR INTERNAL COMBUSTION ENGINES

Filed May 29, 1941

Serial No. 395,884

Fig.1

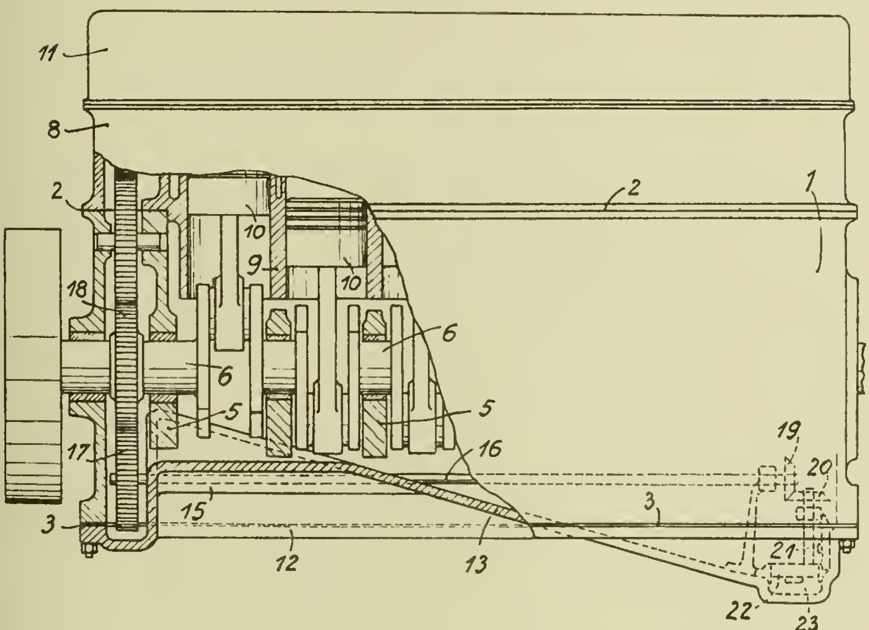
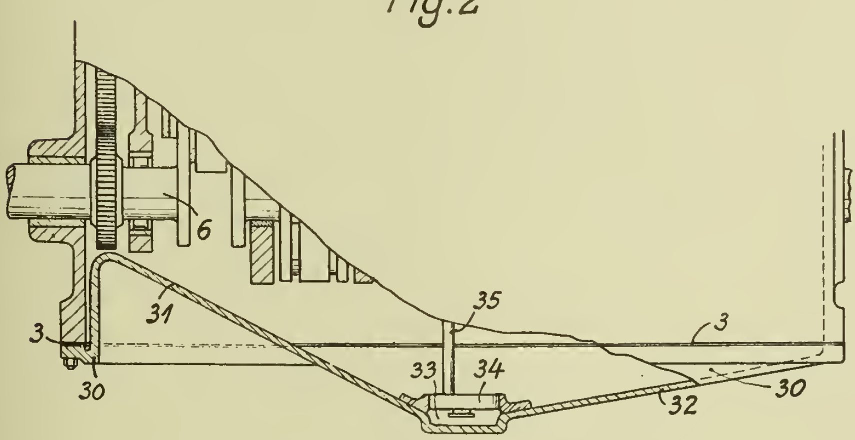


Fig.2



Inventor:
Eugen Stump
By Edmund F. Parry Jr
Attorney

Published May 11, 1943 Serial No. 396,355

ALIEN PROPERTY CUSTODIAN

PROCESS OF CONSOLIDATING OR WATER-PROOFING MORTAR

Carl Letters, Koln-Braunsfeld, Germany; vested in the Alien Property Custodian

No Drawing. Application June 2, 1941

The present invention relates to a process of consolidating or water-proofing or tightening mortar, the expression "mortar" including lime mortar and cement mortar as well as mixtures of same which for instance are obtained if 3 to 5 parts of sand are added to a mixture consisting of 1 part by weight of cement to 2 parts by weight of quick-lime, and is a continuation-in-part of application Ser. No. 53,933, filed December 11, 1935.

It is the aim of the present invention to achieve the well-known good consolidating or water-proofing effect of the lime-soaps in the mortar itself by forming these lime-soaps in the finest possible distributed form so that on the one hand the maximum possible protective effect is obtained and on the other hand practically any scum formation is prevented. In accordance with the present invention this is effected by treating fatty acids of high molecular weight under application of heat with proteins or protein decomposition products and sulphite spent liquor in the presence of non-saponifiable oils and fats, whereupon emulsification with water is effected in an alkaline solution. Hereby the substances of protein products and sulphite spent liquor act as protective colloids in such a manner that the combination of the emulsion with the free lime of the mortar prevents precipitation of the line-soap in the form of coarse flakes. The effect of the protective colloid is shown by the fact that the protective lime-soap is formed in the mortar in a finely divided state and therefore with a high protective effect. Simultaneously this fine distribution prevents that scum films, otherwise formed in the mortar when using normal soaps, loosen the structure of the mortar by air inclusions and thereby impair the density and strength.

This is obtained in accordance with the present invention by the following facts: The protein products used as protective colloids and the sulphite spent liquor chemically react during the manufacture of the emulsion which may be proved by the xanthroprotein-reaction. According to the statements made for instance in Ullmann: "Enzyklopädie der Technischen Chemie" 2. edition, volume 4, page 336, the material to be tested is mixed with concentrated nitric acid and heated. In the presence of protein yellow coloring occurs. When carrying out the process according to the invention the presence of protein cannot be proved which again is a proof for the fact that in the course of the reaction the protein, probably due to condensation with the ingredients of the sulphite spent liquor, has changed to gluco-proteides or similar condensation products.

Oleic acid, stearic acid, abietic acid, linoleic acid and so on are suitable as high molecular fatty acids. The effect of preventing scum or foam formation is increased by small additions of non-saponifiable oils and fats, for instance mineral oils.

It is hitherto not known that lime-soaps could be formed in mortar in the finest state of subdivision, because hereby high molecular fatty acids momentarily react with formation of coarse flakes. This formation of lime-soaps in mortar in the finest state of subdivision was first rendered possible by the invention which disclosed the fact, that by the use of protective colloids and means preventing scum or foam formation an emulsion could be obtained which in the presence of alkali hydroxide contains the high molecular fatty acids in a free non-hydrous form. That this is the case is proved by the following test: 8 grams of oleic acid are heated to about 90° to 100° and a solution of 3 grams of potassium hydroxide in 89 grams of water, heated to 90° and thoroughly stirred, are added. This solution of hydrous potash soap is allowed to stand for 24 hours in a closed vessel, whereupon the viscosity is determined at a temperature of 20°. The solution intended to show the effect of the new method is prepared as follows: 5 grams of animal glue and 12 grams of sulphite spent liquor (50%) are heated with 15 grams of water until all particles are thoroughly mixed. Then 8 grams of oleic acid are added under stirring and heating is continued until a bond results. The solution is then allowed to cool down to 80° and 3 grams of potassium hydroxide, solved in 3 grams of water, are added. The mixture thereby is colored brown. After ten minutes 60 grams of water, having a temperature of about 70°, are stirred into the mixture and after standing for 24 hours the viscosity is again determined at a temperature of 20°. Hereby a viscosity of 4,4 centipoises results, while the soap solution shows a value of 4957 centipoises. This high value is due to the fact, that in the soap solution the soap molecules, owing to their high hydration (emulsion colloid), have molecules of large size. The low value of 4.4 centipoises in connection with the emulsion according to the invention proves that with equal high oleic-and potassium hydroxide-concentration the system has changed to a suspension colloid in which the emulsifiers are not the hydrated soap molecules, but the combined

protein sulphite spent liquor-emulsifier is the carrier of the emulsion, and the fatty acid with simultaneous presence of alkali hydroxide is to be considered as disperse phase. If these two solutions (or their dilutions with water 1:20) are shaked, a stiff scum or foam is formed upon the solution of potash soap which is produced by the hydrated soap molecules, whereas with a solution according to the invention the scum instantaneously breaks on standing. (In this connection see Wo. Ostwald: "Die Welt der vernachlässigten Dimensionen" 9th and 10th edition, pages 80 and followings; Fischer-Hooker "Die lyophilen Kolloide" 1935, pages 6 and followings.)

Another test is as follows: 5 grams of a solution of potash soap (8% oleic acid) are diluted with water to 100 cm^3 in a 100 cm^3 measuring cylinder. After an addition of 10 grams of Portland cement, the mixture is shaked 20 times. After standing for 15 minutes, the sediment formed is read off. 40 cm^3 of coarse flaked particles are precipitated from the soap solution and a portion forms a stiff scum or foam upon the upper surface. In connection with the emulsion the sediment consists of 14 cm^3 of very fine particles, whereas the liquid on top thereof contains a turbid milk of cement with emulsion particles. The scum upon the upper surface is broken or decomposed.

This shows that in spite of the presence of free fatty acids and a free alkali hydroxide in the emulsion, the stability cannot be dependent on the presence of soap, but only on the protective colloid formed by the combination of protein products and sulphite spent liquor. Hereby it is, moreover, proved that the free lime of the cement at once forms with the soap solution very coarse lime-soaps and a stiff scum, whereas with the emulsion the lime-soaps are produced in the finest possible distribution and without the formation of scum.

As with the known process, in this case also it is highly desirable to add lime-soaps to the mortar as well as to effect this in the finest possible distribution. If the ingredients are separately added, this is extremely difficult owing to the high reaction speed of the lime-soap formation. If finished lime-soaps are added to the mortar this is possible in the form of coarse dispersions in which the size of the particles amounts to more than 10 microns, whereas the size of particles of clear or only faintly turbid emulsions is below 0.1 micron. Inasmuch as the degree of the protective effect rapidly increases with the reduction of the particle size, it is quite evident that the present invention is accompanied by a substantial advantage.

It is generally known that a fine dispersion often is highly desired, particularly if an intensive effect is expected, however, the solution of the problem in the present case has nothing whatever to do with a dispersion such as is obtained by the Plausen-colloid mill. It has, moreover, been proposed to avoid the formation of scum in connection with colloid substances in the mortar by adding small amounts of salts of high molecular fatty acids or their sulfonating products, acting as scum or foam destructing agents, to relatively large amounts of protein substances. In this case the water-proofing is not effected by the lime-soap formed, as in the case of the present invention, but the effect is based upon the protein substances which, however, are more or less soluble in water. In connection with the present invention the water-proofing effect requires a genuine or true emulsion which for the purpose of preventing scum or foam formation contains not only non-saponifiable oils and fats, but the combined protein-sulphite spent liquor-emulsifier. The water-proofing effect in the mortar is based chiefly upon the formation of hydrophobic lime-soaps. In this case the aim is to prevent the formation of scum.

The improvement obtained by the new method may be seen from the following table. Mortar plates of dimensions of 4x20x20 cm were produced from a mortar composition of 1 part by weight of Portland cement, 3 parts by weight of sand of mixed grain sizes and 10% of water calculated on the dry mortar. The water-proofing agents were mixed with the water and calculated to 2% based upon the weight of the cement.

Substances added	Weight of the volume of the mortar	Water-tightness of the mortar
None	2.01	Permeable.
Emulsion according to the invention.	2.01	Satisfactorily water-tight.
Insoluble soaps without soluble soaps.	2.01	Somewhat permeable.
Insoluble soaps with alkali soaps.	1.95	Satisfactorily water-tight, reduced strength.
Pure alkali soaps with and without soluble additions.	1.80-1.90	Satisfactorily water-tight, strongly reduced strength.

The results show that the scum formation of soluble alkali soaps strongly reduces the volume weight of the mortar and therewith the strength, while the insoluble, non-scuming soaps cause no decrease of the volume weight but, due to the slight dispersity of the hydrophobic particles, effect a slight water-proofing of the mortar. Other mortar compositions are as follows:

Portland cement	1
Sand of mixed grain sizes	4
Portland cement	½
Hydraulic lime	½
Sand of mixed grain sizes	4
Iron Portland cement	1
Sand of mixed grain sizes	3
Gravel	5

The excellent results obtained with the use of the emulsion according to the present invention are based on the fact that high molecular fatty acids are emulsified in an alkaline solution in the presence of non-saponifiable oils and fats under application of heat with protein substances or protein decomposition products and sulphite spent liquor as emulsifiers and protective colloids. Tests have shown that the scum preventing effect is primarily based upon the fact that the fatty acids are not present as hydrous and, therefore, as scuming alkali soaps, but that the combined protein-sulphite spent liquor-emulsifier is to be considered as emulsifier. Hereby it is of importance that a suitable emulsion may be obtained not by protein alone and also not by sulphite spent liquor alone. The addition of small amounts of non-saponifiable oils and fats serves the purpose of still improving the effect of preventing the formation of scum or foam.

Examples

(*a*) 5 kilograms of stearic acid are mixed with 6 kilograms of mineral oil and molten. Then 12 kilograms of sulphite spent liquor and 7 kilograms of protein (glue) are added which were

treated with 20 kilograms of water, and the mixture is boiled at 100° until a bond has resulted. Thereupon, the whole is allowed to cool to 85° and 6 kilograms of potassium hydroxide (50%) are added and stirred until a uniform reaction product is obtained. Finally 44 kilograms of water, heated to 60°, are stirred into the mixture to finish same.

(*b*) 10 kilograms of oleic acid are heated to 105° with 5 kilograms of mineral oil and therewith are mixed 10 kilograms of protein decomposition products and 15 kilograms of sulphite spent liquor. The mixture is then heated at 100° until an homogeneous substance is obtained. Thereupon cooling down to 80° is effected and 4 kilograms of potassium hydroxide (50%) are added under thorough stirring until a uniform bond indicates the end of the reaction. Finally 56 kilograms of water heated to 80°, are added under stirring.

Suitable protein substances are: waste products of protein of bones, glue flesh or the like which by a treatment with steam under pressure have been decomposed until no gelatinisation occurs when cooled. Moreover, decomposition products of the glue- and gelatine production come into consideration which also may be obtained for instance by alkaline decomposition and which contain protalbine- and lysalbine acids.

Emulsions prepared in the manner described above dissolve in water either to a clear solution or with faint turbidity. If the emulsion is added to dry mortar with such an amount of water that 2 grams of emulsion are provided for each 100 grams of cement, the emulsion has excellent water-proofing effects without impairing the quality of the mortar. This being due to the fact that the active substances in the mortar are present in the finest possible distribution and that the formation of the hydrophobic lime-soaps is obtained, owing to the protective effect of the emulsifier, without the formation of scum films and in such finely divided form that maximum protection is ensured.

Another advantage of this emulsion consists therein, that it has a high wetting power and reduces the quantity of water necessary for the mixture of the mortar. If a mortar of 1 part by weight of Portland cement and 4 parts by weight of mixed sand is produced, then for obtaining a soft mortar, as is required for effecting plasterings, about 14% of water are required. If, however, the emulsion according to the invention is used for preparing the mortar only about 12% of water or liquid respectively are required to obtain the same mortar consistency. Generally, a reduction of the water, necessary to mix the mortar of about 1% results in an increase of the compressive strength of $^{20}\!/\!_{30}$ kg/cm^2. This means a substantial advantage when using the emulsion. Moreover, the plasticity of the mortar is increased, the mortar may more easily be formed, is prevented from breaking when dry, retains the water and is difficultly to separate which is of particular advantage for instance in connection with concrete for casting purposes which often must be fed or supplied over large distances without being separated.

CARL LETTERS.

Published May 11, 1943

Serial No. 397,138

ALIEN PROPERTY CUSTODIAN

PROCESS OF PRODUCING FILMS, COATINGS AND IMPREGNATIONS

Hans Fikentscher and Rudolf Gaeth, Ludwigshafen-on-Rhine, Germany; vested in the Alien Property Custodian

No Drawing. Application filed June 7, 1941

The present invention relates to a process for the preparation of films, coatings, impregnations and bondings.

Films, coatings, impregnations and bondings resistant to water have already been prepared with the aid of aqueous dispersions of organic film-forming polymerization products which after drying were no longer dispersible in water. It has also been proposed to employ for the same purpose aqueous dispersions of water-insoluble polyvinyl compounds containing a small amount of hydrophilic groups which rendered such dispersions more stable, but films, impregnations and coatings thus prepared are, however, not sufficiently resistant to water.

We have now found that films, coatings, impregnations and bondings well resistant to water can be prepared with advantage industrially from water-insoluble organic film-forming polymerization products containing a small amount of hydrophilic groups and shape-stable at ordinary temperature by separating the said polymerization products from the aqueous dispersions resulting from the emulsion polymerization of the corresponding monomers without plasticizing them, redispersing them in water, applying the dispersion thus obtained to a substratum, evaporating the water and rendering the residue plastic at least for a short time. It has been found that by this treatment the polymerization products lose their property of being redispersible and, therefore, become resistant to water. In separating the said polymerization products from the aqueous dispersions resulting from the emulsion polymerization it must be carefully avoided, that they come into the plastic state either by the action of heat or solvents, since otherwise they would no longer be redispersible. The water, contained in the dispersions must, therefore, be removed at temperatures as low as possible and organic solvents must be excluded.

For rendering the films, coatings or impregnations produced with the aid of the said polymerization products at least transiently plastic, they are exposed, for example to the action of heat. In practice, it is sufficient to heat the polymerization products to sintering. A water-resistant layer is thus obtained after cooling. Alternatively, the polymerization products are rendered plastic by adding to the redispersed polymerization products volatile solvents or non-volatile plasticizers; a water-resistant layer of the polymerization product will then be obtained already at room temperature after the water of the dispersion and the volatile solvent, if any present, have evaporated.

The use of such dispersions of the said redispersible polymerization products offers considerable advantages in practice, because the polymerization products can be stored and marketed in a solid state and the consumer only needs to disperse them before use. Hitherto the dispersions themselves had to be stored and shipped to the consumer, so that the large amounts of water in the dispersions were transported and big containers required, which facts made the manipulation of the products very inconvenient and, in addition, caused increased charges for transport. The redispersible polymerization products used according to the present invention in contradistinction to the dispersions hitherto practically exclusively used are not subject to coagulation under the influence of frost or shaking during the transport or prolonged storage.

Suitable water-insoluble organic film-forming polymerization products possessing a stable shape at ordinary temperature and forming stable dispersions with water are, for example, interpolymerization products of one or more water-insoluble vinyl compounds, as for example acrylic nitrile, styrene, vinyl ketones, vinyl chloride, acrylic esters, vinyl esters, vinyl ethers, butadiene or their homologues or substitution products or methacrylic or fumaric or maleic acid esters on the one hand with small proportions of one or more water soluble polymerizable compounds, as for example such as contain a carboxylic acid, carboxylic amide, hydroxyl or amino group, for example acrylic acid, methacrylic acid, maleic acid and fumaric acid, or their amides or water-soluble metal salts, furthermore methylol vinylmethyl ketone, acrylic acid ethanol amine esters, as also N-vinyl compounds, for example N-vinyl pyrrolidone or N-vinylpiperidone on the other hand. Polymerization products in which hydrophilic groups are produced by a chemical after-treatment, for example carboxylic or hydroxyl groups by the saponification of ester groups, can also be employed. Polymerization products which possess no stable shape, i. e. which are plastic and exhibit some flow already at ordinary temperature, are not suitable in the present process, since they are not redispersible and, therefore, do not fulfill one of the requirements of the present invention.

The dispersions to be used according to the present invention can be admixed with the substances usual in the production of films, coatings

and impregnations, as, for instance, pigments, dyes, fillers and the like substances.

The following examples serve to illustrate how the present invention may be carried out in practice, but the invention is not restricted to these examples. The parts are by weight.

Example 1

800 parts of vinyl chloride and 200 parts of vinyl benzoate are emulsified in a solution of 30 parts of sodium octodecane sulphonate, 30 parts of the reaction product of 1 mol. of octodecyl alcohol with 20 mols of ethylene oxide, 60 parts of acrylic acid and 10 parts of potassium persulphate in 3000 parts of water and polymerized in a pressure-tight vessel at 50° C. The dispersion obtained is dried below 60° C., yielding a white polymerization product which is hard at ordinary temperature and can be redispersed to a stable dispersion by treating with water rendered weakly alkaline.

A fabric made of staple fibres from regenerated cellulose is immersed into a 5 per cent dispersion prepared from the dry powder, and dried in the air. The resulting size can be easily removed with water. However, if the sized fabric is dried at a temperature above the sintering point of the polymerization product, for example, at about 100° C., the size becomes highly resistant to washing.

Example 2

500 parts of vinyl chloride and 500 parts of vinyl acetate are emulsified in a solution of 60 parts of sodium octodecane sulphonate, 60 parts of acrylic acid and 10 parts of potassium persulphate in 3000 parts of water and polymerized in a vessel resistant to pressure at 45° C. The dispersion thus prepared is freed from water, for example, by being atomized below 40° C. in known manner. A white polymerization product is obtained which is hard at ordinary temperature and gives a stable dispersion when treated with water rendered weakly alkaline.

Cotton linters are immersed into an aqueous dispersion containing 5 per cent of the dry powder and 40 per cent (with reference to the polymerization product) of butylacetate and dried in the open air at ordinary temperature. A size fast to washing in a marked degree is thus obtained.

By spraying a concentrated dispersion of the dried powder on to metallic surfaces and then exposing the article to temperatures of between 90° and 120° C., durable and waterproof coatings are obtained.

Example 3

750 parts of styrene and 250 parts of acrylic acid methyl ester are emulsified in a solution of 10 parts of the sodium salt of octodecane sulphonic acid, 10 parts of the reaction product of 1 mol of octodecyl alcohol with 20 mols of ethylene oxide, 20 parts of acrylic acid and 5 parts of potassium persulphate in 1000 parts of water and polymerized at from 75° to 90° C. There is obtained an about 50 per cent. aqueous dispersion of the polymerization product from which either the water is evaporated at ordinary temperature or which is freed from the water as quickly as possible at a moderately raised temperature, for example by atomizing in a "Krause" drier. The white polymerization product thus obtained is hard at ordinary temperature and can be repassed into a stable dispersion with water rendered weakly alkaline.

This dispersion of the dry powder of about 50 per cent strength is admixed with 30 parts of dibutyl phthalate as plasticizing agent and if desired with pigments and applied to plaster or masonry. Coatings which are fast to washing, rubbing and weathering are thus obtained.

Example 4

800 parts of styrene and 200 parts of methacrylic acid methyl ester are emulsified in a solution of 30 parts of sodium octodecane sulphonate, 3 parts of sodium persulphate and 40 parts of monomeric acrylic acid in 1000 parts of water and polymerized at from 80 to 85° C. The polymerization product obtained in the form of a dispersion of about 50 per cent is dried by atomizing at from about 60 to 65° C. A fine white powder is thus obtained which can again be made into a stable dispersion by treating with ammoniacal water.

By admixing 100 parts of an about 50 per cent of the aqueous dispersion prepared from the dry powder with 17 parts of dibutyl phthalate and 35 parts of water and applying the mixture onto paper or leather a glossy water-proof finish is obtained.

Example 5

500 parts of styrene and 500 parts of methacrylic acid methyl ester are emulsified in a solution of 30 parts of sodium octodecane sulphonate, 3 parts of sodium persulphate and 20 parts of monomeric acrylic acid in 1000 parts of water and polymerized at from 80 to 85° C. The polymerization product obtained in an about 50 per cent dispersion is dried by atomizing at from about 60 to 65° C. A fine white powder is obtained which can again be made into a stable dispersion by means of ammoniacal water.

By admixing 100 parts of an about 50 per cent dispersion from the dry powder with 35 parts of butyl phthalate and 35 parts of water and applying the mixture, if desired with an addition of pigments, to plaster and masonry, coatings fast to washing, rubbing and weathering are obtained.

Example 6

500 parts of vinyl benzoate and 500 parts of methacrylic acid methyl ester are emulsified in a solution of 30 parts of sodium octodecane sulphonate, 5 parts of sodium persulphate and 40 parts of monomeric acrylic acid in 1000 parts of water and polymerized at from 80 to 85° C. The polymerization product obtained in the form of a dispersion of about 50 per cent strength is dried by atomizing at about 60 to 65° C. A fine white powder is obtained which can again be made into a stable dispersion by means of alkaline water.

A mixture of 100 parts of an about 35 per cent dispersion of the dry powder and of 35 parts of tricresylphosphate is employed for bonding paper with paper, leather with leather, leather with wood or leather with paper. After drying, the joints between the said materials are very strong and resistant to water.

Example 7

10,000 parts of vinyl benzoate are emulsified in a solution of 200 parts of sodium octodecane sulphonate, 100 parts of an interpolymerization product from 75 parts of acrylic acid and 25 parts of dimethylaminoethyl vinyl ether, 400 parts of monomeric acrylic acid and 50 parts of sodium persulphate in 10,000 parts of water and polymerized at from 80 to 85° C. The polymerization product thus obtained in a dispersion of 50 per

cent strength is dried on a vacuum drying roller at between 30 and 35° C. A white powder is obtained which can again be made into a stable dispersion by means of alkaline water.

100 parts of an about 30 per cent aqueous dispersion from the dry powder are mixed with 5 parts of tricresylphosphate and made up with water to form a five per cent dispersion. Cell wool is plunged into this dispersion and then allowed to dry at 80° C. A finish highly resistant to washing is obtained.

Example 8

500 parts of vinyl chloride, 250 parts of vinyl acetate and 250 parts of vinyl benzoate are emulsified in a solution of 90 parts of sodium octodecane sulphonate, 20 parts of sodium polyacrylate, 10 parts of potassium persulphate and 40 parts of the sodium salt of monomeric acrylic acid in 3000 parts of water and polymerized at from 45 to 50° C. in a pressure-tight vessel. After drying the dispersion of the polymerization by atomizing at a temperature of from about 50 to 55° C., a fine white powder is obtained which can again be made up into a stable dispersion by means of water.

100 parts of an about 30 per cent aqueous dispersion prepared from the dry powder are mixed with 30 parts of tributylphosphate and the mixture is used for bonding wood to wood, paper to wood, cotton to cotton, cotton to wood or cotton to paper. Strong and water-proof joints are obtained after drying.

Example 9

1000 parts of styrene are emulsified in a solution of 30 parts of the product obtained by acting with chlorine and sulphur dioxide on a mixture of paraffinic hydrocarbons containing from 9 to 15 carbon atoms in the molecule and saponifying the resulting product with sodium hydroxide solution, 5 parts of sodium persulphate and 30 parts of monomeric acrylic acid in 1000 parts of water, and polymerized at from 85 to 90° C. By drying the dispersion of the polymerization product on a vacuum drying roller at 50° C., a fine powder is obtained which can again be made up into a stable dispersion by means of alkaline water.

By mixing 100 parts of a dispersion prepared from the dry powder with 5 parts of dibutyl phosphate and spraying the mixture onto metallic surfaces, water-proof coatings are obtained after drying at a temperature of from 110 to 150° C.

HANS FIKENTSCHER.
RUDOLF GAETH.

Published May 11, 1943 Serial No. 398,421

ALIEN PROPERTY CUSTODIAN

BINDERS FOR GLASS FIBER THREADS

Hans Steinbock, Dusseldorf-Gerresheim, Germany; vested in the Alien Property Custodian

No Drawing. Application filed June 17, 1941

This invention relates to binders for threads or strands of glass fibers and like fibers, of the general character described and claimed in my application Serial No. 284,100, filed July 12, 1939, for Letters Patent of the United States, from which the present application is a division.

According to my present invention the binder consists of diluted aqueous solutions of animal, vegetable or mineral oils, fats, waxes and the like or mixtures thereof and gelatine as an adhesive. These emulsions can be prepared in the usual manner practised in the art of making emulsions with the use of suitable emulsifying agents.

A glass fiber thread or strand sized with a binder according to the invention after the setting of the binder is well closed, soft and supple and has a brilliant, slightly fatty surface which renders it highly suited for textile treatments. The setting of the binder may be accelerated by artificial drying. The binder can be readily removed again by the common textile washing media, such as aqueous soap solutions or the like.

An example of a binder according to the invention is composed as follows:

	Parts
Water	80 to 90
Emulsifying agent such as fatty acid sulphonate	3 to 5
Animal or vegetable oil	3 to 5
Gelatine	3 to 5

Without affecting the possibility of removing the binder from the finished products by washing, the binder may be given either a more pronounced binding effect or a more pronounced lubricating effect as desired in accordance with the purpose for which it is used by a proper selection of various oils or by suitably mixing oils and fats, adding waxes and using suitable emulsifying agents.

HANS STEINBOCK.

Published May 11, 1943

Serial No. 398,422

ALIEN PROPERTY CUSTODIAN

BINDERS FOR GLASS FIBER THREADS

Hans Steinbock, Dusseldorf-Gerresheim, Germany; vested in the Alien Property Custodian

No Drawing. Application filed June 17, 1941

This invention relates to binders for threads or strands of glass fibers and like fibers, of the general character described and claimed in my application Serial No. 284,100, filed July 12, 1939, for Letters Patent of the United States, from which the present application is a division.

According to my present invention the binder consists of diluted aqueous solutions of animal, vegetable or mineral oils, fats, waxes and the like or mixtures thereof, with or without water-soluble adhesives, and an addition of sugar syrup which is preferably up to 5%.

These emulsions can be prepared in the usual manner practised in the art of making emulsions with the use of suitable emulsifying agents.

A glass fiber thread or strand sized with a binder according to the invention after the setting of the binder is well closed, soft and supple and has a brilliant, slightly fatty surface which renders it highly suited for textile treatments. The setting of the binder may be accelerated by artificial drying. The binder can be readily removed again by the common textile washing media, such as aqueous soap solutions or the like.

Some examples of binders according to the invention are composed as follows:

A.

	Parts
Water	80 to 90
Emulsifying agent such as fatty acid sulphonate	3 to 5
Animal or vegetable oil	3 to 5
Yellow dextrine	5 to 10
Sugar syrup	Up to 5

B.

	Parts
Water	80 to 90
Emulsifying agent such as fatty acid sulphonate	3 to 5
Animal or vegetable oil	3 to 5
Gelatine	3 to 5
Sugar syrup	Up to 5

Without affecting the possibility of removing the binder from the finished products by washing, the binder may be given either a more pronounced binding effect or a more pronounced lubricating effect as desired in accordance with the purpose for which it is used by a proper selection of various oils or by suitably mixing oils and fats, adding waxes and using suitable emulsifying agents. Thus, various modifications and variations may be resorted to without departing from the spirit and scope of the present invention as defined in the appended claims.

HANS STEINBOCK

Published May 11, 1943

Serial No. 398,008

ALIEN PROPERTY CUSTODIAN

METHOD OF AND MEANS FOR MAKING AND APPLYING CORRUGATED WOOD

Friedrich Wilhelm Franke, Leipzig, Germany; vested in the Alien Property Custodian

Application filed June 14, 1941

This invention concerns the method of and means for corrugating wood and of applying corrugated wood, for instance in corrugated ply wood, or for and in novel articles and materials described and claimed in my parent application Serial No. 185,492 of January 18th, 1938, entitled "Materials Comprising Corrugated Wood and Method of Making Same" and hereinafter shortly reviewed. The instant patent matter is divided as a continuation in part out of parent application Serial No. 185,492.

The corrugated wood may be defined as a crimped or waved sheet of ply of wood, or as wooden boards placed into folds, flutes, pleats or the like. The term corrugated ply wood has been applied in analogy to corrugated cardboard, so that the corrugated ply wood may be defined as corrugated wood assembled on one or both sides with one or more layers of sheet material.

For difficulties inherent to wood, corrugated wood and material assembled therefrom are not commercially available. Processes are known, which pass wood through a corrugating apparatus. But it is not the object of such processes to produce a predeterminedly corrugated wood. Their object is rather to "fracture" the sheets of wood in order to loosen the fibrous structure and to render them pliable and flexible, so that they may be curved and bent when used, for instance when applied as a veneer. Exhaustive experiments concerning the corrugation of sheets of wood led up to the discovery and invention concerned herein. When practices commonly used for corrugating other materials were applied, invariably the resulting corrugated sheets of wood were found to be unstable and otherwise unsatisfactory, because sooner or later they warp or otherwise lose the intended shape; and they crack, splice and splinter. Furthermore the resultant corrugated boards were found to be lacking in strength, apparently because the fibrous structure had been loosened and weakened. These shortcomings became more particularly evident, when the corrugated product was cut, e. g. sawed; as a matter of fact a clean saw-cut was found to be practically impossible.

It is the general object of this invention to overcome these disadvantages, and devise a method and means for commercially producing a serviceable and durable corrugated wood.

According to other objects of the invention the corrugated wood is to be incorporated in suitable structural shapes or profiles, such as plywood.

Particular objects of this invention are: To provide a wooden material which will not be destroyed nor harmed by the corrugating operation; to protect and retain the ply or sheet by a film or covering; to associate the film or covering intimately with the ply; to coordinate such association with the corrugating of the ply in order to avoid stress and strain; to provide apparatus timing such operation and for duly setting the corrugated wood during fabrication; to render the fabrication continuous; to coordinate the fabrication with an incorporation of the corrugated wood in a structural material; to impregnate the wood before or after corrugation with binders and infiltrations otherwise enhancing the characteristic of the wood; and to assemble the corrugated wood into predeterminedly resilient, flexible or rigid material.

Further objects of this invention will be learned from the following description thereof, which dwells upon specific examples, such specific examples being however shown and described for purposes of illustration only, and not in limitation of the invention.

In order to prevent the fibrous structure of the wood from being unduly damaged by the corrugating process, I start with a freshly stripped web of wood, i. e. a foil of green wood, or thin web of wood which has been rendered pliable like freshly stripped wood by suitable treatment such as steaming or soaking.

Such green or specially conditioned sheeting of wood will hereinafter be defined as a pliable ply of wood, such ply being flexible in its extent normal to the grain which is substantially the direction of corrugating, i. e. the corrugations are substantially in line with the grain.

If so desired a web may be used which is impregnated with synthetic resins, or other plastics.

A protective film is provided upon one or both sides, i. e. the top and the bottom of the foil or ply. This protective covering may be a thin layer, foil or film of paper, fabric, metal or plastic or synthetic material. As an adhesive between the web and the protective covering a suitable glue may be used, preferably a glue containing silicate. Sodium-potassium silicate mixed with glucose, carbonate of lime and a fatty oil rendered soluble in water by sulphonating have been found to be particularly suitable for such purpose. The covered web may be further treated with synthetic resin or the like.

Aside from binding and retaining the wood, the covering of ply may also serve for physical protection and as a seal.

As or when the covering and the web are or

have been thus assembled they are passed through a corrugating process,—the corrugations extending substantially in the direction of the grain of the wood. For instance the covering and web are assembled, and are passed and shaped and thermoset between fluting rollers in one and the same apparatus.

Heat is applied to the assembled and corrugated material, for instance by heating the tools corrugating the assembled sheets. Thus there may be a continuity of operation, in which the gluing proceeds the assembling of the cover and wood sheets and the assembled parts are corrugated before and during the setting of the adhesive and heat is applied.

If flat sheets, e. g. of wood or plywood are to be applid to the top or the bottom or both of the corrugated wood, such a step may be added to the continuity of operations just mentioned, the apices of the corrugated wood being attached to the flat material; e. g. an adhesive is applied to the apices and the parts are set and secured upon each other while passing through or over heated surfaces.

The corrugated foil which is thus assembled with flat sheeting, represents a corrugated plywood, to which preference may be given in many instances over the much heavier plywood of the old art.

But if the grain of corrugated wood and of a flat ply thus assembled run in the same direction, i. e. in the direction of the corrugations of the corrugated wood, the assembled material is still flexible in one direction. After it has been curved by bending in such direction, another flat sheet may be applied to the exposed side of the corrugated wood, whereupon the material becomes stiff and set in the curved formation and may serve as a curved wall, for instance for a barrel for fruit and the like. When, contrary to the arrangement just described, the grain of the flat covering plate extends at right angle to the grain and corrugations of the corrugated wood, the resultant corrugated plywood is elastic but not bendable.

Aside from the advantage of greater resiliency and of less weight over the ordinary plywood, the corrugated plywood also excels in heat and sound insulating properties, and the hollow corrugations may be filled with a suitable insulating material, e. g. cork, or with other materials for other purposes such as reinforcement, if so desired.

As compared with corrugated cardboard the material of this invention presents of course greater stiffness and strength. Pluralities of layers of corrugated wood may be assembled with each other, e. g. by gluing them together at or near the apices where they rest upon each other. This offers a hatched structure of great elasticity, when used as a filler.

Or flat sheets are interposed and assembled between layers of corrugated wood, yielding particular strength because of triangulation. One or more layers of corrugated wood or corrugated plywood may be suitably encased at their ends and sides.

Furthermore a plurality of assembled sheets of corrugated wood or plywood may be interposed, for instance in a limited width, and between boards, and will stuffiy space said boards apart.

In the drawings:

Fig. 1 diagrammatically illustrates an apparatus for assembling and corrugating plies of wood according to this invention.

Fig. 2 shows the corrugated sheet from the side, in longitudinal cross-section.

Fig. 3 is a side view illustrating the assembling into shaped plywood.

The remaining figures are perspective views.

Fig. 4 shows a sheet of corrugated and of flat ply assembled with each other.

Fig. 5 is the showing of a corner of a flat sheet of corrugated plywood.

Fig. 6 shows a section of a board, in which material of this invention is endwise interposed between cover boards. The end of one of the cover boards is shown to be lifted.

Fig. 7 shows a corrugated wood of this invention enclosed in a casing or frame. The flat cover plies are partly sectioned away.

Fig. 8 is the top end of a column, in which sheets of corrugated wood are assembled in honey comb formation in a continuous outer casing.

Similar letters refer to similar parts throughout the various views.

The apparatus of Fig. 1 provides for circular and chain conveyors for shaping corrugated wood and for engaging thereon and carrying it along. Thus the two chain conveyors **12** and **13** may have pulleys **11** at their ends, over which travels the belting **14**. A surface meshing with the corrugated wood a' may be, for instance, provided upon the belting **14** by mounting thereon a corrugated resilient metal sheet **15**, said sheet being fastened upon, e. g. riveted onto the belting **14** where it abuts thereupon.

The rollers **16**, **17** and **18** are similarly peripherally fluted or corrugated, and may be suitably heated. For the latter purpose they may be hollow, so that steam supplied by a suitable pipe system **19** may be passed therethrough. The pipe system **19** includes a connection **20** to the level heating compartment **21**. This compartment has a smooth surface upon which the finished product slides to the right, out of the machine.

These parts are mounted in the frame **22** of the apparatus, the pulleys and rollers **11**, **16**, **17** and **18** being rotatable and relatively adjustable, as it may be required for tightening the belt conveyors **12** and **13**, and for providing between surfaces the clearance desired for a corrugated ply a' passed through the machine. At suitable points a plate or shield **23** may be provided for guiding and retaining the product passing over the conveying means or for supporting the conveyor chains or belts themselves. A synchronous drive (not shown) retains the rollers **16**, **17** and **18** in meshing registry, and may also serve to drive one or more of the pulleys **11**.

The frame **22** is loaded out in order to provide a platform **24** on which a ply a is slid into the machine, and also supports for the rolls of covering web b and for the gumming devices **25**. These devices apply a suitable adhesive, e. g. glue, to the webs b before they pass into the machine, and to the apices of the corrugated wood a' as it swings into abutment with the cover ply i to be assembled at the bottom of the machine.

The operation is, for example, as follows:

The two gummed covering webs b and a pliable ply of wood, e. g. a sheet of freshly stripped wood a are drawn into the corrugating apparatus by the intermeshing, heated or corrugating rolls **16** and **17**, and issue from said rollers as sheet of corrugated wood a', which may be suit-

ably redirected by guides **23** for further heating and shaping around roll **17**, between rolls **17** and **18** and around roll **18**.

The two covering webs *b* were coated with an adhesive after they had been taken from the respective supply rolls and contacted with the gumming rollers of gumming devices **25**. Sheet *a* of wood enters centrally between said webs *b* and the three layers are assembled just before they are forced together in corrugated formation by the overlapping teeth of the rollers **16** and **17**. It is particularly noted that the corrugated sheet is reversed and bent in opposite direction around roll **18** during the thermosetting operation.

It is the object of the protective covering *b* to keep the sheet *a* from bursting and shrinking, to prevent the corrugated wood from splintering if handled, bent, cut to size, etc., to intercept humidity and prevent reaction of the wood to changes of pressure, humidity and temperature of the atmosphere, and, generally, to help to preserve a fixed and predetermined shape of corrugations. When the corrugated wood *a* is subsequently assembled into corrugated plywood or otherwise, the protective covering also prevents undue influence of adhesive additionally applied.

After films have thus been applied to both sides of the ply *a*,—which will be done more often then applying only one film to the ply,—the corrugated sheeting *a'* has the appearance indicated in Fig. 2, when it enters between the conveyors **12** and **13**.

In the continuity of the operation of the apparatus of Fig. 1 the corrugated wood may then be incorporated in the plywood. The drawing indicates for such purpose a gumming device **25** at the left end of the machine, which gums the apices of corrugations at the wood as they pass down over conveyor **13**. Before the freshly gummed corrugated wood passes onto the heater **21**, a flat ply of wood, e. g. *i*, is fed between the moving corrugated wood and the heater, the heater setting the abutting faces in adhesion, and they pass out of the machine to the right as a corrugated plywood *a'i*. The grain of ply *i* is presumed to run normal to the direction of the grain of the corrugated wood *a'*, so that the product is a stiff board, as shown in Fig. 4.

If plies *i* are applied to opposite sides of the corrugated board *a'* the plywood of Fig. 5 is obtained.

If instead of ply *i*, in which the grain runs athwart that of the ply *a'*, a ply *j* is used, in which the grain runs in the same direction as that of the corrugated wood *a'*, then the resulting plywood *t* is still flexible, and may for instance be arranged to extend in the curve indicated in Fig. 3. But if then another ply *j*, in which the grain also runs in the same direction as in the corrugated wood *a'*, is glued onto the top of the corrugated plywood *c*, the curve is permanently set in the resulting plywood *d*.

Of course the veneer applied to one or both sides of the corrugated ply may be plywood by itself, as suggested in Fig. 7.

Here as well as in the other instance where the corrugated wood produces voids in the finished material, the void may be filled itself with suited materials, like cork, etc., or there may be a coating or packing of layers of gypsum, e. g. together with saw dust, concrete, tar, cement, etc.

Along the margin of a board the space between the veneer *i*, *j* or *ij* may be outwardly closed by boards *p* and *q*, as indicated in Fig. 7. Substantially in alignment with the clearances of the corrugated wood *a'* the wooden strip *q* may be transversely grooved, for instance by way of half round openings *r*, which serve as air ducts. A panel of this kind is suitable for doors, walls and the like.

A number of sheets of plywood like that shown in Fig. 4, which comprise one layer of corrugated wood *a'* and one layer of flat wood *i* with grains running rectangular to each other, may be stacked and glued together in multiple formation. Fig. 6 shows, that such a formation may be cut to extend at a limit width and may then be glued at the cut ends to opposite boards *m* and *n*, which are thus rigidly spaced apart.

In such honey comb arrangement the central flat partitions may be omitted for other purposes, for instance in connection with a pillar like that shown in Fig. 8, where the corrugated boards *a'* are glued together at their apices and also onto the surrounding angular frame of boards *s* and *t*, and will thus complete the assembly of a rigid post or column.

It is understood that in all cases the board *m*, *n*, *s* and *t* or the veneers *i* and *j* do not necessarily have to be made of wood, but may also be any of the many other sheet materials known today, as they are cardboard, sheet metal, pressed board, sheets of condensation products and other synthetic resins, etc.

FRIEDRICH WILHELM FRANKE.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. W. FRANKE

METHOD OF AND MEANS FOR MAKING AND APPLYING CORRUGATED WOOD

Filed June 14, 1941

Serial No. 398,008

2 Sheets-Sheet 1

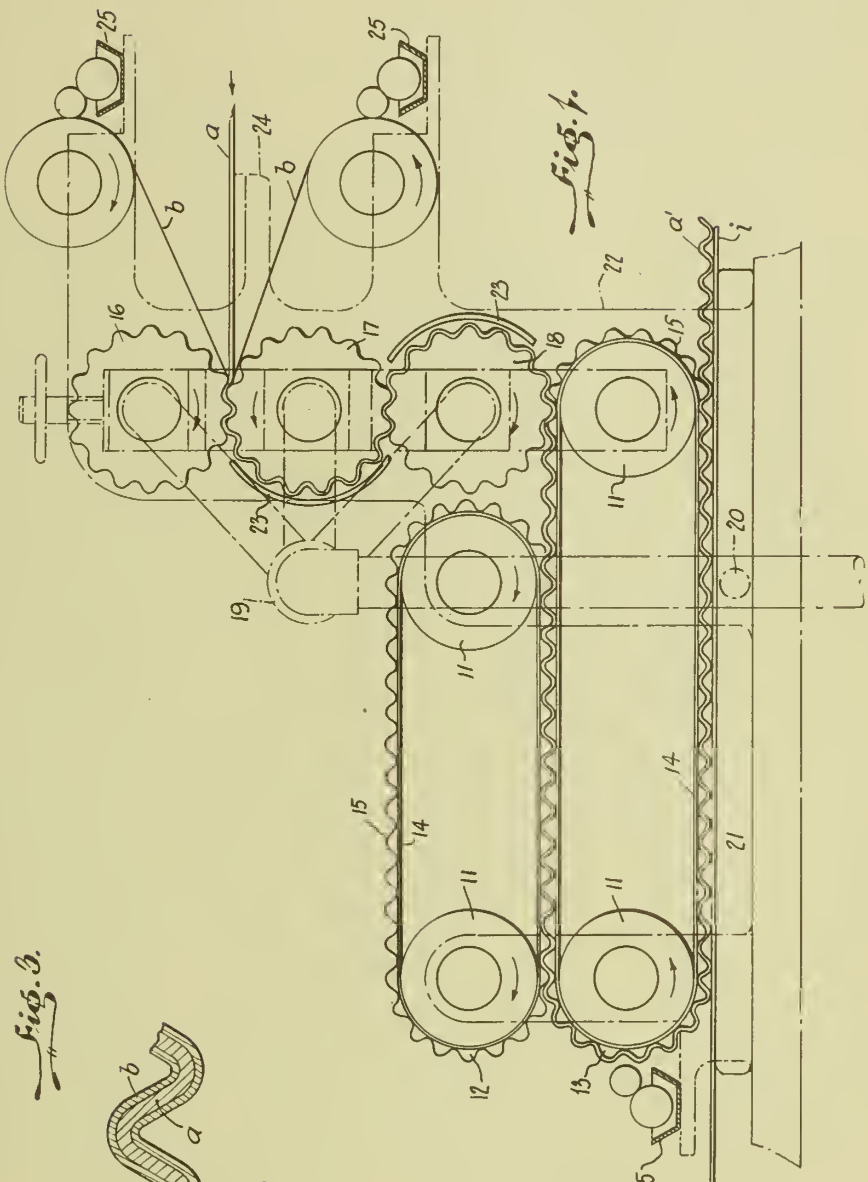


Fig. 1.

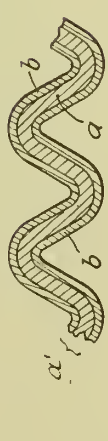


Fig. 2.

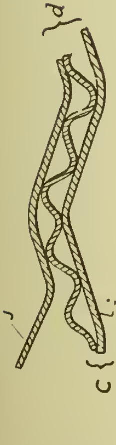


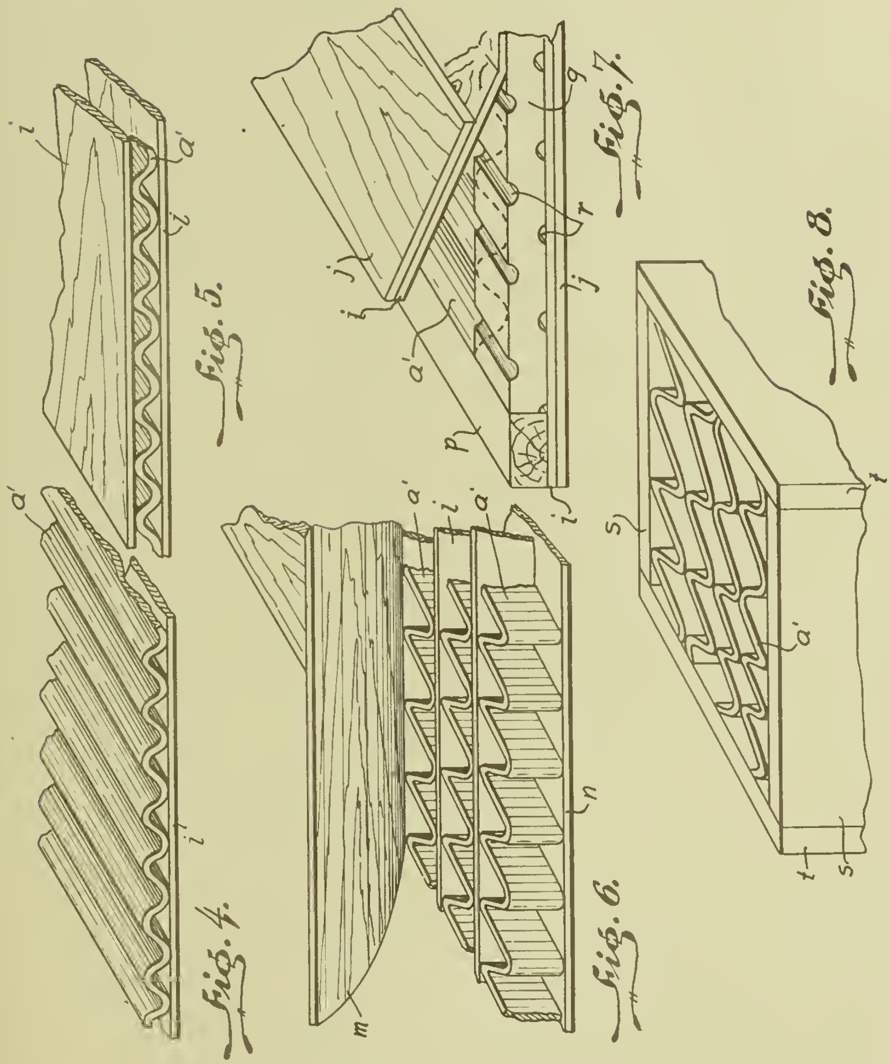
Fig. 3.

INVENTOR.

FRIEDRICH WILHELM FRANKE.

BY Rudolf Wildermann

PUBLISHED	F. W. FRANKE	Serial No.
MAY 11, 1943.	METHOD OF AND MEANS FOR MAKING AND APPLYING CORRUGATED WOOD	398,008
BY A. P. C.	Filed June 14, 1941	2 Sheets-Sheet 2



INVENTOR.
FRIEDRICH WILHELM FRANKE.
BY
Rudolf Hildemann

Published May 11, 1943 Serial No. 397,372

ALIEN PROPERTY CUSTODIAN

DISTRIBUTOR FOR FLUIDS

Hans Klein, Mannheim, Otto Hemmann and Rudolf Keinke, Leuna, and Oskar Hofmann and Wilhelm Boehmer, Halle-on-Saale, Germany; vested in the Alien Property Custodian

Application filed June 10, 1941

The present invention relates to an apparatus for the introduction of fluids, i. e. gases, vapors or liquids, into enlarged spaces.

In many industrial processes it is necessary that gaseous, vaporous or liquid materials be passed through a supply pipe into enlarged spaces to be subjected therein, for example, to a reaction, purification or decomposition, or used for feeding a flame. While it is not harmful or even desirable in many cases if the speed of flow of the materials to be introduced is diminished before their entry into the enlarged space, the speed of flow must not or but little be decreased or it must even be increased in other cases to prevent undesired reactions or ignitions occurring before the reaction chamber. This is especially difficult to accomplish if the gases or liquids, in entering the enlarged vessel, are to be uniformly distributed over its whole cross-sectional area. In the apparatus hitherto used the speed of flow is considerably diminished at the place where the supply pipe is joined to the enlarged vessel by a funnel-shaped connecting tube.

We have now found that a reduction of the speed of flow can be avoided and the gases, vapors or liquids can be uniformly distributed over the whole cross-sectional area of the enlarged reaction chamber by arranging in the funnel-shaped tube, which connects the supply-pipe with the enlarged reaction chamber, a distributor comprising a plurality of annular channels of such a cross-section that the total free cross-section of the channels at any point is approximately equal with the cross-section of the supply pipe, the cross-section of the different channels being so proportioned to one another as to effect a uniform distribution of the gases, vapors or liquids over the whole cross-sectional area of the enlarged vessel. For this purpose, the annular channels are so proportioned in diameter that they are largest in the outer zone but become increasingly more narrow towards the middle.

The object of our present invention will be more fully understood from the following description when read with reference to the accompanying drawing which diagrammatically illustrates, by way of example, a distributor of the type designed for use in the conversion of gases. The section is laid along the longitudinal axis.

In the supply pipe A the rod-shaped displacer body B is so arranged that its conical end projects into the enlarged reaction chamber C. The gas-mixture to be reacted in chamber C flows through the annular free space of the supply pipe A into the channels a_1, a_2, a_3 and a_4 of the distributor. In proportion as the pipe A widens, the channels are decreased in diameter so that the free cross-sectional area of the total of the channels is kept unchanged and the speed of flow of the gases is but little diminished. For constricting the channels in the said manner the partition walls D and the connection ribs (not visible in the figure) which keep the latter at the desired distance from each other, have proper shapes, for example the shape of an inverted stream-lined body.

In order to ensure a uniform distribution of the gas over the whole cross-sectional area of the reaction chamber, the channels become smaller in width from the outer channel inwards, viz. from a_1 to a_4, so that channel a_1, being largest in diameter, also allows the greatest volume of gas to pass.

In the funnel-shaped openings of the channels displacer bodies E are inserted to provide for another splitting of the current of gas passing through each channel. If the gases flowing through the annular space formed by A and B describe a helical path, as easily occurs, they are axially aligned by the distributor system according to our invention. In order to assist this alignment it is preferable to make the lower ends of the connection ribs between the partition walls D blade-shaped and to direct the ends of the blades towards the flow of the materials.

To prevent the flowing materials from forming whirls they should not, by the walls of the channels or the connecting ribs, be deviated by more than about 6° from the axial direction.

The distributor may, depending on the materials with which it is to be contacted in use, be made of a variety of materials, for example of iron or other metals, wood or ceramic material. When made of the latter material the annular partition walls can be formed from moulded stones and the ribs provided between the walls so shaped that the distributor may be assembled ring by ring. In this case the ribs are preferably divided and the upper parts thereof made integral with the annular parts of the walls.

All those parts of the distributor contacting the streaming materials are made as smooth as possible, using, for example, glazed stones, so as to avoid whirls and suchlike troubles in the streaming material.

Distributors in accordance with our present invention may be used for cold or hot gases, vapors or liquids. Their exit area may be in any direction. When turned upwards it may serve at the same time for a grate, for example for filler bodies

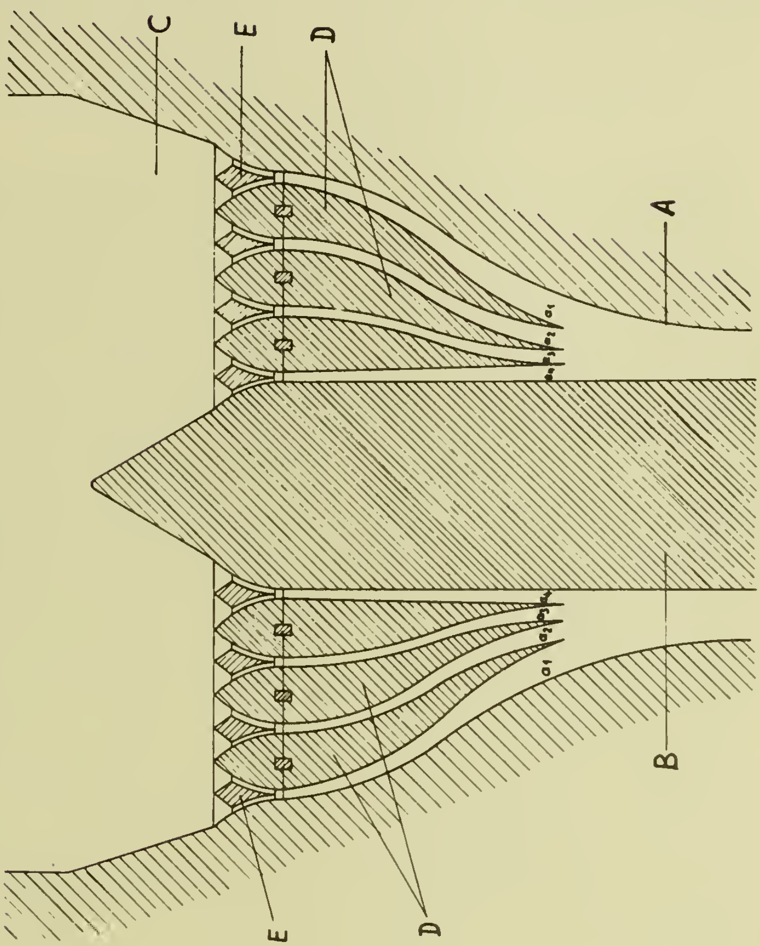
or catalysts. The distributors are especially suited for apparatus in which gases, for example hydrocarbons, are to be reacted with other gases, for example oxygen or chlorine. In all these cases it is necessary to prevent that the speed of flow of the gases, on passing to the enlarged reaction chamber, be markedly diminished, in order to avoid troubles, for example undesired reactions or ignitions.

HANS KLEIN.
OTTO HEMMANN.
RUDOLF KEINKE.
OSKAR HOFMANN.
WILHELM BOEHMER.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. KLEIN ET AL
DISTRIBUTOR FOR FLUIDS
Filed June 10, 1941

Serial No.
397,372



Hans Klein
Otto Hemmann
Rudolf Keinke
Oskar Hofmann
Wilhelm Boehmer
INVENTORS

BY

THEIR ATTORNEYS

Published May 11, 1943 Serial No. 398,831

ALIEN PROPERTY CUSTODIAN

INTERNAL COMBUSTION ENGINE

Hugo Ruppe, Berlin, Germany; vested in the Alien Property Custodian

Application filed June 19, 1941

The invention relates to an internal combustion engine especially appropriated to be mounted rotatable between the spokes of the wheel of a vehicle, f. i. of a normal front wheel of a cycle. In such motors known per se the connecting rods are fixed on the axle of the vehicle, the axle thereby forming a crankshaft; during the working the rods are supported on the rigid axle of the wheel in such a manner that the cylinders fixed on the spokes may rotate with the vehicle.

The invention consists therein that the crankshaft is replaced by an excentric fixed on a sleeve rotating on the rigid axle of the wheel. The sleeve (or hollow axle) is connected to a disk turning with respect to the wheel axle and to the motor casing through a gearing the last pinion of which is fixed in a concentric manner on the disk so that when stopping or braking the disk the gearing is rolling off on the pinion and the sleeve and the engine cylinder rotate with respect to the wheel axle.

Further details of the invention are described in the following specification and illustrated in the drawings. These show as one embodiment of the invention an auxiliary engine for cycles, viz:

Figure 1 a section through the motor according to the rectangular line I—I of Fig. 5, the two section-planes being represented in the same plane;

Figure 2 the gearing of the motor according to Fig. 1 in an enlarged scale;

Figure 3 a view on line III—III of Fig. 2;

Figure 4 the cylinder head in a view from above;

Figure 5 the motor on line V—V of Fig. 1;

Figure 6 the motor mounted in a front-wheel;

Figure 7 in an enlarged scale the scheme of the gearing and the coupling means;

Figure 8 the scheme of the electric means of the motor.

1 is the front wheel fork of a normal cycle, the fork prongs on the wheel axle being spaced apart from one another f. i. by 3¾ inches. **2** is the wheel axle which serves for stiffening the front wheel fork. In this case it serves also as axle for the double needle bearing **3**; on the needle bearing **3** is rotatable mounted a sleeve or hollow axle **4** which on its left end is formed as a pinion **5** (Fig. 2). Washers **6** limit the normal displacement of the sleeve **4**; further they limit together with the axle shoulder **7** provided in the middle of the axle the axial movement of the needles. On both sides of the washers **6** there are provided ball bearings **8** carrying the motor casing **9**, **10** on which are located the spoke rings **11**, **12** which at the sime are fixed by the screws **13** of the motor casing. On the circumference of the motor casing there are located on opposite sides the cylinders **14**, **14** and in a right angle thereto also on opposite sides the casing for the ignition coil **15** and the casing for the coil **16** for the lighting current. **17** designates the commutator for the igniter (Fig. 8).

The gearing of the motor consists of the axle sleeve **4**, the double excentric **18** and the disks **19** and **20** of light metal which are fixed by screws **23** (Figs. 2, 3, 5). Further on the sleeve **4** there is provided a flat rotary valve **27** controlling the admission of gas. The disk **20** carries the magnet ring **22** and has ribs **21** curved against the turning sense and forming a turbofan. The gas flows in the path indicated by arrows. **24** is a filling piece (Fig. 3) inserted into the magnet ring for balancing this magnet ring of anti-magnetic metal and fixed as the magnet ring itself by screws **25** on the disk **20**. The sleeve **4** has a longitudinal key **28**, upon which is pressed the double excentric **18** with the two disks **19**, **20**. The rotary valve **27** is axially movable and pressed against the wall of the motor casing by a spring **25′** in order to obtain a tight abutment. The sleeve **4** with the double excentric **18** replaces the usual crankshaft of the motor while the magnet ring **22** serves as the same time as fly wheel. The pinion **5** is the element transmitting the force of the motor. The rotary valve **27** has on different diameters two slots **29** located one opposite the other and coacting with two slots **30** also located on opposite sides in the wall of the motor casing-half **10**. The arrangement of these slots on different diameters has the purpose to effect only one admission of gas into the crank casing during each rotation of the rotary valve. The curved lengths of the slots in the rotary valve and in the casing are so dimensioned that the admission of gas is effected during 180° of the rotation and the slots **29** in the rotary valve **27** are so dimensioned that in spite of their different arrangement the rotary valve is balanced. The connecting rods **31** have on the one side eyes of corresponding dimensions and are mounted by means of balls on the double excentric **18**. The balls are held in the illustrated distance from one another by a cage or rings especially formed (Fig. 5).

The half **10** of the casing has a circular ledge **32** (Fig. 1), on which is abutting a fixed disk

34 which loosely runs on the wheel axle 2 and which is influenced f. i. by a star-like formed leaf-spring 35; the disk is fixed by a strut 54 by means of cams. On the place of abutment is inserted into the disk 34 a circular felt ring 33. In this manner between the wall of the casing 10, the ledge 32 and the disk 34 is formed a circular channel into which leads a tube 39 (Figs. 5 and 6) on which is fastened the carburetter 43 (Fig. 6).

Around the circular ledge 32 is formed a second circular channel thereby that the disk 34 on its circumference also has a circular ledge 36 with a felt ring 37 which extends into the hollow room of a corresponding circular channel of the motor casing. Within this second channel is fastened a metallic ring 41, isolated on the motor casing, the ring being in connection with the coil for the lighting current. The disk 34 carries an isolated contact 40 (Fig. 4) serving for the supply of the current for the lamp and slipping on the ring 41.

The drive of the motor is transmitted to the wheel by means of pinions the construction of which is to be seen in Fig. 1 and the mutual position of which is represented in Fig. 7, in a schematic manner. The pinion 5 on the sleeve 4 is in engagement with a pinion 44, which is rigidly connected to a less pinion 46. The double pinion 44, 46 is rotatable on a pin 45 which by means of a flange is pressed into the casing-half 9. This pin 45 carries on its end an expanding ring which prevents that the double pinion glides off. In Fig. 1 the pinion 47 is located under the axle 2 because it is represented in a plane displaced for 90°. The little pinion 46 is in gear with the pinion 47 fixed on a shaft 48 which is extended outwardly through the wall of the casing-half 9 and here carries a pinion 49. This pinion is in gear with a pinion 50 located loosely on the wheel axle 2. The pinion 50 is secured by a nut 42 on the wheel axle and supported against the motor casing by means of balls and ball rings 56. The pinion 50 is fixed on a grooved disk 51 through screws or rivets 52. A steel wire 53 running around the grooved disk 51 serves together with the disk as a coupling device. The one end of the wire 53 is fixed on a strut 54 connected with the cycle fork and the other end is secured to a lever rockable by means of a Bowden wire. Each fork prong is provided with a strut 54 which is located on a shoulder of the nut 42 and fixed on the prong by means of a clamp 55.

The operation of the described arrangement is the following:

When the cycle makes a stop the rotation of the gearing is transmitted on the pinion 49 by means of the double-pinion 44, 46 and of the pinion 47, the pinion 49 turning the grooved disk 51 through the pinion 50. If the disk 51 is stopped by means of the wire 53 also the pinion 50 is stopped so that the pinion 49 rolls off on the pinion 50 and through the shaft 48 mounted in the motor casing takes with it the casing and thereby turns it. In consequence of the connection of the motor casing with the spoke rings 11, 12 also the front wheel is set in rotation. In Fig. 1 there is yet represented a disk 57 which serves only for filling the room in the motor casing between the disk 19 of the gearing and the wall of the motor casing-half 9. This disk 57 has openings into which the pinions 5, 44, 46 and 47 extend. Further this disk 47 forms a second bearing for the shaft 48 and finally it abuts on a flange provided on the shaft 48 thereby securing it from breaking out of the wall of the casing. The disk 57 is therefore fastened to the casing-half 9 by means of screws.

Fig. 8 represents the electric parts. 22 is as already said a permanent steel magnet ring having the poles N and S. The pole shoes 58 extend from the exterior through two slots provided in the motor casing and arranged the one opposite to the other close to the magnet ring 22. The pole shoes 58 are cemented air- and oil-tight in the cover 59 consisting advantageously of pressed plastic material and serving to close the slots of the motor casing. The cover 59 is made of a material not conducting the electric current in order to prevent the production of electric eddy or braking fluxes round the pole shoes 58. These shoes have four-cornered openings into which are extended U-shaped cores of iron carrying the colis. The commutator 17 is actuated by a cam 26 of the disk 19 and preferably consists of a handle of hardened sheet-steel pressed into corresponding slots of the disk 19. The cam 26 is of such length that the contact is interrupted when according to Fig. 8 the edge of the S-pole of the magnet ring passes the upper edge of the pole-shoe now being in the zone of the N-pole.

Fig. 6 shows the exhaust pipes 60 and the silencer 61. The slots 62 for the exhaust of the gases are enclosed by thin elastic tongues of band-steel the longitudinal edges of which are positioned angularly the one near the other. The tongues are spread by the pressure of the exhausted gas whereby the noise of the exhaust is retained which precedes the pressure of the gas. Any oil accumulated in the silencer may be eliminated by unscrewing the locks 63.

Fig. 4 represents the shape of the cooling ribs chosen so that the spokes may pass thereon. The whole arrangement permits to take off the cylinders and the silencer with the exhaust openings for cleaning purposes through the space between the spokes without the necessity to take off the motor. In the same manner all electric parts may be taken out between the spokes.

The benzin tank not illustrated is preferably located in the frame and connected to the carburetor through a benzin tube. In order to procure a second brake device the spoke ring 12 is provided with a hollow part or rim containing a tension wire fixed to an auxiliary strut and actuated by a Bowden wire (Fig. 1).

In the chosen embodiment of the invention the motor is rotatable and used for the drive of a cycle. It may also be provided with stationary cylinders f. i. for the drive of a water pump, of a dynamo or for other purposes. In the same manner the coupling and braking means may be constructed otherwise in accordance with the intended application.

HUGO RUPPE.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. RUPPE
INTERNAL COMBUSTION ENGINE
Filed June 19, 1941

Serial No.
398,831
3 Sheets-Sheet 1

Fig.1

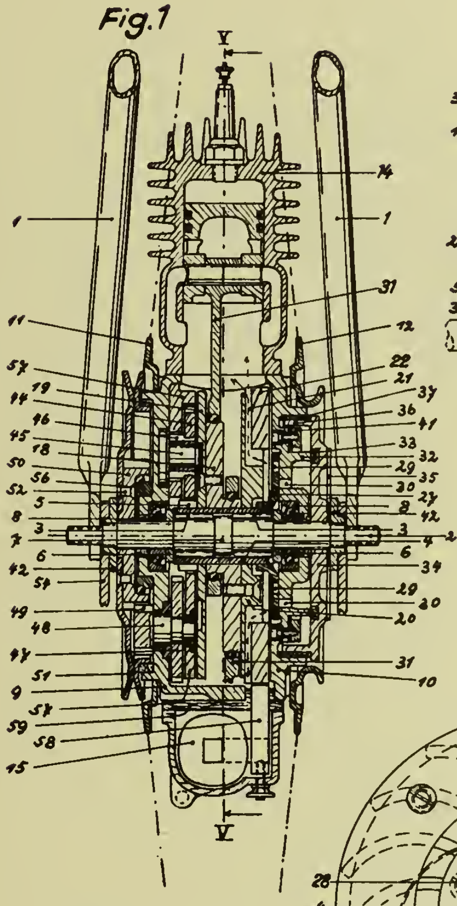


Fig.2

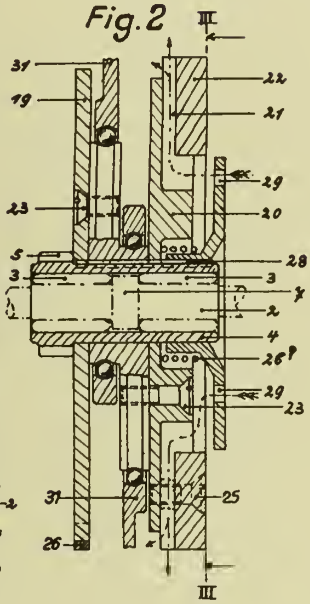


Fig.3

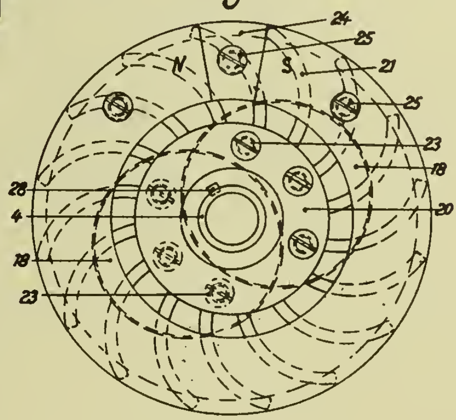
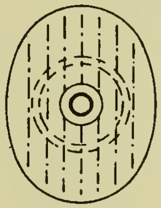


Fig.4



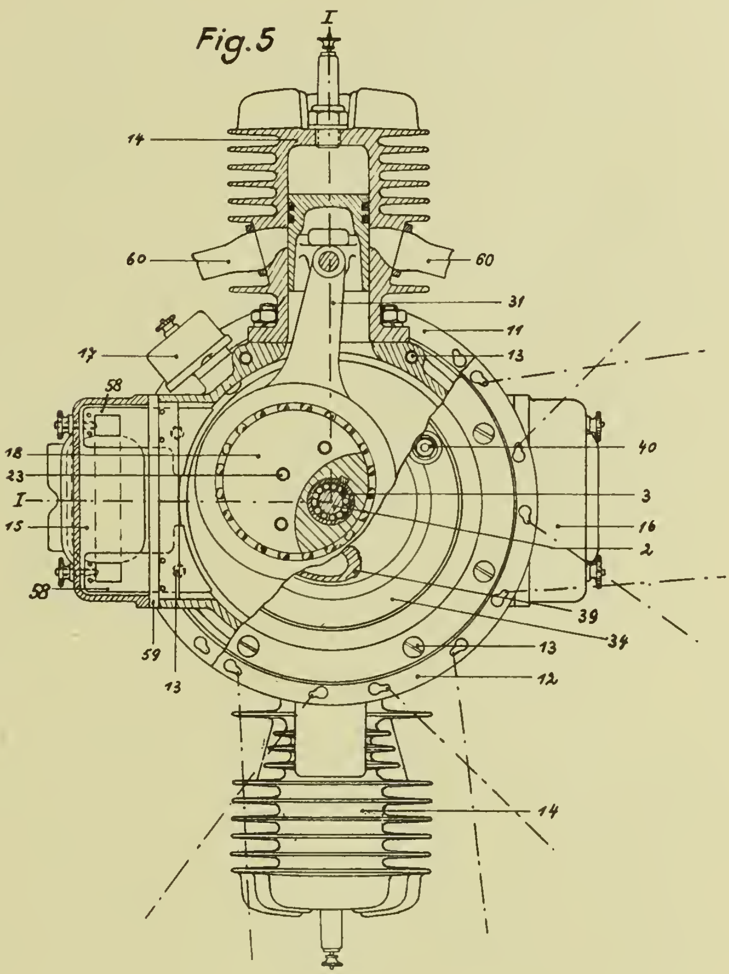
Inventor:
Hugo Ruppe,
Emory L. Groff
Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. RUPPE
INTERNAL COMBUSTION ENGINE
Filed June 19, 1941

Serial No.
398,831
3 Sheets-Sheet 2

Fig. 5



Inventor:
Hugo Ruppe,
By Emory L. Groff
Attorney

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. RUPPE

INTERNAL COMBUSTION ENGINE

Filed June 19, 1941

Serial No.

398,831

3 Sheets—Sheet 3

Fig.8

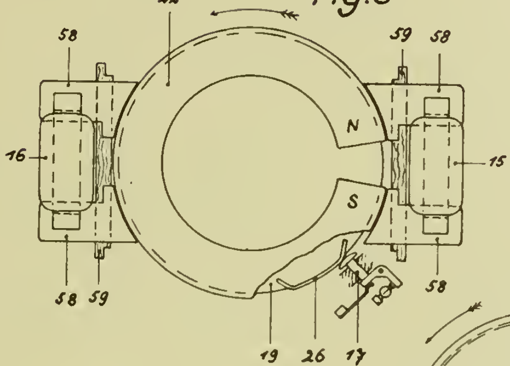


Fig.7

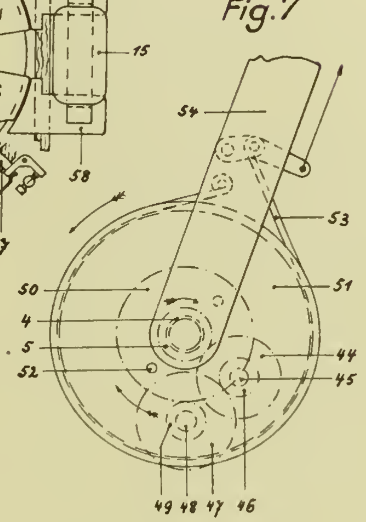
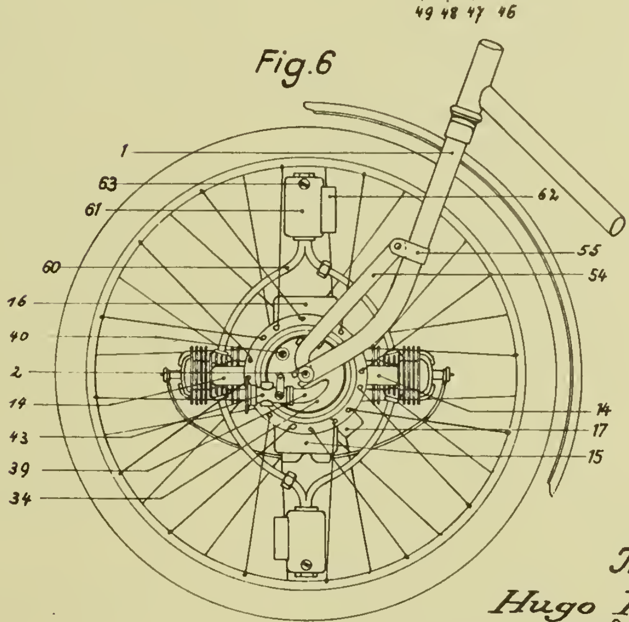


Fig.6



Jnventor:

Hugo Ruppe,

By [signature]

Attorney

Published May 11, 1943 Serial No. 398,922

ALIEN PROPERTY CUSTODIAN

WHEEL WITH SPRING SPOKES

Andries de Jong, The Hague, Netherlands; vested in the Alien Property Custodian

Application filed June 20, 1941

My invention relates to a wheel with spring spokes.

One object of my invention is to create a wheel with spring spokes that can be used in place of wheels provided with pneumatic tires and having an elastic working at least about the same as said tire-wheels.

Another object of my invention is to provide a wheel with spring spokes which can be driven without hindering the elastic suspension of the hub.

A further object of my said invention is to create a wheel with spring spokes which has a simple structure and which can be manufactured cheaply.

Among the objects of my invention is also to furnish a wheel with spring spokes having about the same aspect as a wheel with a pneumatic tire.

Other and further objects of my invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the accompanying drawings an embodiment of my invention is shown.

Fig. 1 shows a side-view of a wheel according to the invention, the plate covering therewith being removed,

Fig. 2 shows a cross section according to the line II—II in Fig. 1, the plate covering also being shown,

Fig. 3 shows a cross section of the concentric ring in the neighbourhood of the width of passage for a damping plunger,

Fig. 4 shows a part of a longitudinal section of the concentric ring near said width of passage for a damping plunger and

Fig. 5 shows a suchlike plunger partly in cross section.

Therewith 1 indicates the rim of the wheel being provided with an elastic running surface 2 of solid gum or a suchlike material.

The hub 3 has guide faces 4 for the flat parts 11 of the covering plate 16.

This structure will be discussed hereinafter.

A cross-coupling 5 is fixed to the hub 3 said coupling also being performable as a so-called cross-coupling-disc.

Radial, hydraulic damping plungers 7 are arranged between the rim 1 and the hub 3, said plungers consisting of a wide and narrow part.

A spring 8 lies around the wider part of the plunger and is fastened to same for example by means of an adjustable ring 9, so that a certain play may be adjusted between the concentric, stiff pressing-ring 6 and the end of this spring lying at the side opposite to the ring.

The wider part of the plungers contains an oil-chamber 22.

The drawsprings 10 lying around the narrow part of the damping plungers at the inside of the ring 6 are arranged in an intermittent manner relative to the compression springs 8. These damping plungers have spherical shaped wide and narrow ends, so that they fit in correspondingly formed apertures 12 and 13, respectively arranged at the rim 1 and at the hub 3. The hub 3 is fastened at a drum 14 or the like driven by the shaft 15.

To enable driving of the wheel while its elastic working remains present, plates 16 and 16′ are arranged, said plates being connected with the hub 3 by means of above mentioned cross coupling 5.

By this the hub can be displaced relative to the rim of the wheel out of the center of same, while driving remains possible.

The hub 3 being displaced relative to the plates 16 and 16′ the flat parts 4 of the hub slide along the flat parts 11 of the plates.

The plates 16 and 16′ are connected to each other and to the rim 1 by means of bolts 17 and 18.

The draw springs 10 are fastened to the hub 3 and the ring by means of adjustment rings 19 and 20 so that the tension of same can be regulated.

The damping plungers 7 being compressed over some distance, the springs 8 abut with their inside ends against the ring 6, so that when compression goes on they will be compressed less or more.

Now the effected forces will be transmitted to the draw springs 10 lying above the hub 3 by means of the ring 6.

Remaining within the scope of the invention it is possible to make the compression springs less strong than the draw springs so that the former will be compressed wholly before the latter will come into action.

However it is also possible to make the compression springs stronger than the draw springs, so that at first the the latter will come into action and after that the compression springs.

To prevent a too large drawing out of the draw springs for instance a rabbet may be arranged at the damping plungers.

The drawing shows an example of performance according to first mentioned case, with which the compression springs itself, when wholly com-

pressed, form a displacement limitating rabbet.

In both cases the resistance of the wheel against shocks and bumps gradually increases.

Figs. 3 and 4 show in what manner the damping plungers 7 pass through the ring 6.

The width of passage 21 in the cross section of the ring 6 has about the same breadth as the plungers, in the longitudinal direction of this ring however these openings are somewhat larger.

By this the plungers are able to displace somewhat relative to the ring 6 so that they can get another position which is necessary in connection with the displacement of the hub 3 out of the center of the wheel, the latter being loaded.

To enable overturning of the plungers over a certain angle in a better way, the openings 21 have a rather sharp inner edge which also is advantageous for the mounting of the wheel.

For by this arrangement the plungers can be placed somewhat sloping in the ring 6, together lying in a conical shaped plane and with their small ends reaching in a direction to the shaft 15 so that they can be placed with their broad ends into the apertures 12. After that the small ends are to be placed into the apertures 13 of the hub 3 still lying somewhat to the outside.

This being done the hub 3 with the plungers can be pushed to the center of the wheel.

Fig. 5 finally shows the performance of the hydraulic damping plungers. The wider part of same has a chamber 22, filled with a fluid e. g. oil.

The rod 24 being displaceable into the wider part of the plunger arrangement and lying tightened by means of a packing gland 25, the piston 27 pushes the oil or other fluid through the opening 28, the by-pass canal 26 and the opening 29 to the space being present under the piston 27

By this a gradually damping working will be obtained, so that the wheel according to the invention in practice can take up all shocks and this in a manner at least as well as with wheels with a pneumatic tire.

The arrangement works as follows:

In the beginning only the plungers will be compressed, taking up the light shocks.

The load increasing also the compression springs 8 will come into action by that the play between these springs and the ring 6 disappears.

The springs 8 being compressed wholly the effected forces will be transmitted to the draw springs 10 lying above the hub 3 by means of the pression ring 6.

As appears from the abovementioned the resistance of the wheel against shocks gradually increases, while—and this is very advantageous—the hydraulic plungers will damp the light shocks so that a wheel according to the invention has about the same effect as a wheel with a pneumatic tire.

The cross coupling 5 therewith enables driving of the wheel in an excellent manner, this coupling not hindering the elastic suspension of the hub 3. The coupling consists of a cross 5 turnable between two ears arranged at the hub on one hand and turnable between two ears arranged at the plate 16 on the other hand.

From this plate (and the plate 16′) the driving force will be transmitted to the rim 1 so that the elastic working of the plungers and springs will not be hindered by that they otherwise would be obliged to transmit a driving couple.

It will be clear that the invention also includes those performances with which a very small play is present between the compression springs and the ring 6, even if this play would be very slight or not at all present.

The resistance of a spring when coming into action in the beginning is very small, so that no practical cooperation with the ring will be present then.

Also in this case the damping plungers can do their work very well.

My invention is not limited to the embodiments shown, but various changes may be made without departing from the scope of my invention.

So the invention may be used not only for motorcars, but also for motorcycles, bicycles, sportcars, perambulators etc.

In that case the dimensions of plungers, springs etc. of course must be altered correspondingly.

ANDRIES DE JONG.

PUBLISHED	A. DE JONG	Serial No.
MAY 11, 1943.	WHEEL WITH SPRING SPOKES	398,922
BY A. P. C.	Filed June 20, 1941	

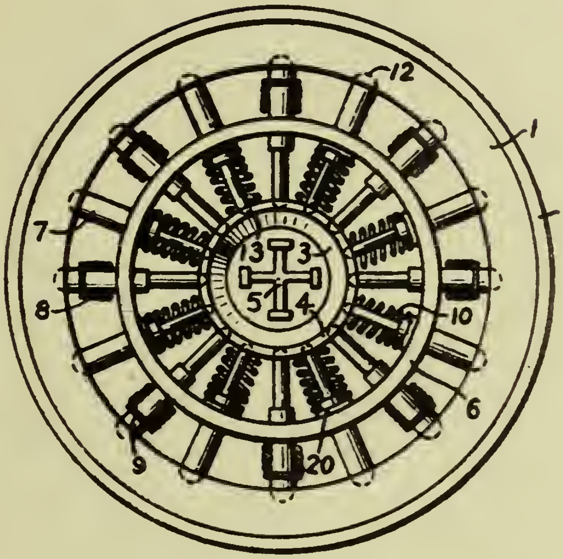


FIG. 1.

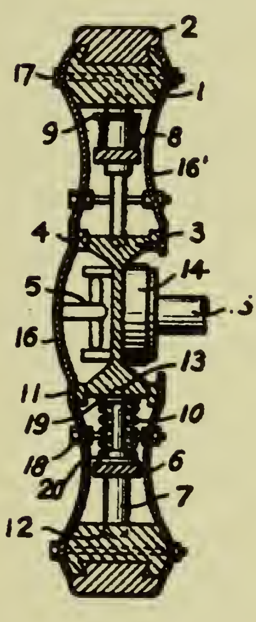


FIG. 2.

FIG. 3.

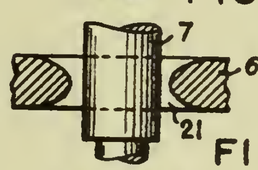


FIG. 4.

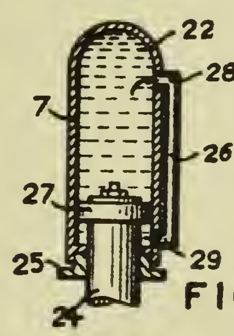


FIG. 5.

INVENTOR

Andries de Jong

BY Frederick E. Hale

Published May 11, 1943 Serial No. 400,274

ALIEN PROPERTY CUSTODIAN

MACHINE FOR THE MANUFACTURE OF HELICALLY WOUND SPRINGS IN PARTICULAR SPRINGS BEING NARROWER AT THE ENDS THAN INTERMEDIATELY E. G. DOUBLE CONICAL SPRINGS

Hendrikus Knoop, Utrecht, Netherlands; vested in the Alien Property Custodian

Application filed June 28, 1941

The invention relates to a machine for the manufacture of helically wound springs, in particular springs being narrower at the ends than intermediately, e. g. double conical springs, comprising a rotary core gauge and a device for determining the pitch of winding of the spring on the gauge.

The invention has for its object to considerably simplify a machine of this kind and thereby to make it much cheaper than the hitherto known machines.

The invention is based upon the insight that if it were possible, after having helically wound an originally straight spring-metal wire on a core of the required, e. g. double-conical, shape, to remove said core from the spring in a simple manner, a practical machine for the manufacture of these springs could be built, doubtless to be preferred over the known, expensive and complicate machines.

The solution of this problem consists in this that according to the invention the core gauge comprises an axially removable spindle carrying a core body composed of a series of adjacent annular disc shaped pieces or slices together having an external shape corresponding to the internal shape to be given to the spring to be made by helically winding a spring wire and having a thickness smaller than the spacing of the windings of the helical spring to be made on this core gauge in its original or in a stretched shape. By reason of the fact that the spindle is removable in axial direction the pieces of the core gauge will fall down through between adjacent windings upon removal of the spindle.

In connection with the relation existing between the pitch of the helical spring and the thickness of said annular disc shaped pieces the machine may have a pitch control means ensuring that on the core body a spring will be wound with the required pitch. Preferably said device is a counter-gauge to the core gauge, e. g. a diabolo-shaped member for a double-conical core gauge. This member is rotatably mounted with its axis parallel to the axis of the spindle and it is further adjustable towards and away from the core gauge and adapted to be locked in position. Preferably this member is also interchangeable with a view to helical springs of different shape. The adjustability towards the core and away therefrom is desirable with a view to springs of different thickness of the spring wire and with a view to the insertion of the spring wire to be wound and the detensioning or partial recoiling of the spring after having been helically wound.

By a suitable choice of the thickness and the external diameter of the annular disc-shaped pieces, constituting the core body or gauge, in connection with the shape of the helical spring to be made and the use of a corresponding pitch control means it is possible to make on the machine helical springs of various shapes. Cylindrical helical springs may, if desired, also be made thereon although in this case the composition of the core body of annular disc-shaped pieces is not strictly necessary. The machine is particularly adapted for the manufacture of the double-conical or otherwise shaped helical springs in which there are relatively wide windings between narrow end-windings.

Further features of the invention will be explained more fully hereinafter.

The drawings illustrate by way of example a machine according to the invention for the manufacture of double-conical helical springs.

Figure 1 is a side elevation of this machine.

Figure 2 is, on a larger scale, an elevation of a core gauge adapted for use in this machine.

Figure 3 is an elevation of a double-conical helical spring to be made by means of said machine, this elevation being also on a larger scale than Figure 1.

The machine according to Figure 1 has a base **1** to which bearing-pedestals **2** and **3** are secured. A short shaft **4** is freely rotatably but axially non-slidably supported by the pedestal **2**. The shaft **4** carries a belt pulley **5**. At the end of the shaft **4** remote from said pulley the shaft by means of a clamping cone **6** engages a corresponding recess of a head **7** of a core spindle **8** the other end **9** (Fig. 2) of which is provided with internal screw thread for a screw **10** having a hexagon **11** provided with a center hole **12** (Fig. 2).

A center **13** supported in said hole is adapted to be clamped in position by means of a screw **14** and hand-wheel **15**, said screw being supported by the pedestal **3**. The adjusted position of the screw and center may be fixed by means of a non-illustrated toggle-device or the like located at the rear side of the pedestal **3**. The core-spindle **8** may thus be rotated by means of the belt pulley **5**. The spindle **8** carries a series of annular discs **15** adapted to be clamped together between a collar **16** of the head **7** and a collar **17** of the hexagon **11**. Together they constitute a core body or core gauge having the shape appearing from Figure 2.

In Figure 1 this core gauge is as a whole denoted by **18**. Above this gauge a pitch control

means is located constructed as a counter gauge **19** rotatably but non-slidably mounted on a horizontal spindle **20** the axis of which is parallel to that of the horizontal core-spindle **8**. The spindle **20** is at its ends provided with squares **21** each carried by a screw **22** in a vertical guiding slot **23** of the pedestals **2** and **3** respectively. The screws **22** may be screwed upwards or downwards by means of hand-wheels **24** so as to adjust the counter gauge **19** towards the core-gauge **18** or away therefrom. The counter-gauge **19** corresponds in shape to the double-conical core-gauge **18** and in this instance is diabolo-shaped. Within the core-body **19** a helically wound groove **25** is made the width of which corresponds to the thickness of the spring wire to be wound and the pitch of which corresponds to that with which the spring wire is to be helically wound on the core gauge **18**. The head **7** at the side of the core gauge is provided with a pair of axial bores **26** and **27** of different diameter for the insertion of a spring wire end of corresponding diameter and bent at right angles. There might also be more than two bores.

The machine operates as follows:

A straight spring wire is with its bent end inserted e. g. in the bore **26** of the head **7**. The wire will then be located between the core gauge **18** and the counter gauge **18** which in its vertical guides **23** has been somewhat lifted. Now, the counter gauge **19** is lowered until the spring wire will rest in the first winding groove of said gauge. This gauge is then left in this final position. Then the core gauge **18** is rotated by means of the belt pulley **5** and the spring wire is thereby helically wound on the core gauge between the two gauges. The groove **25** determines the pitch of the windings. As soon as the spring wire has been wound on the core gauge **18** for a sufficient length the drive of the belt pulley **5** is stopped. The counter gauge is then screwed upwards and the helical spring will be somewhat detensioned, however, still remaining on the core gauge **18**. Now, by means of the hand wheel **15** the center **13** is screwed axially to the right in Figure 1 whereafter the core gauge and the head **7**, the hexagon **11** and the spring are removed from the machine. Then the hexagon **11** is screwed off and the spindle **8** may be withdrawn from the spring. The pieces or annular discs **15** will now subsequently fall down between the spring windings. Care has of course been taken to use discs **15** of corresponding thickness, that is to say having a thickness smaller than the spacing of the helical windings of the springs in finished condition. A finished spring is denoted by **28** in Figure 3.

It will be clear that by the use of annular discs of different thickness and external diameter helical springs of various shapes may be made in the machine. Correspondingly shaped and grooved counter-gauges will of course be necessary, which to this end may be adapted to be removed axially from the shaft or may be made interchangeable otherwise.

Further double-conical springs may be made in the machine, which in longitudinal section are concave or convex; also springs of other shape may be made in the machine.

In order to remove the core gauge from the machine, the pedestal **3** might e. g. be slidable over the base **1** in the longitudinal direction of the spindle **8**.

HENDRIKUS KNOOP.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

H. KNOOP

MACHINE FOR THE MANUFACTURE OF HELICALLY WOUND SPRINGS IN PARTICULAR SPRINGS BEING NARROWER AT THE ENDS THAN INTERMEDIATELY E. G. DOUBLE CONICAL SPRINGS

Filed June 28, 1941

Serial No. 400,274

Fig. 1.

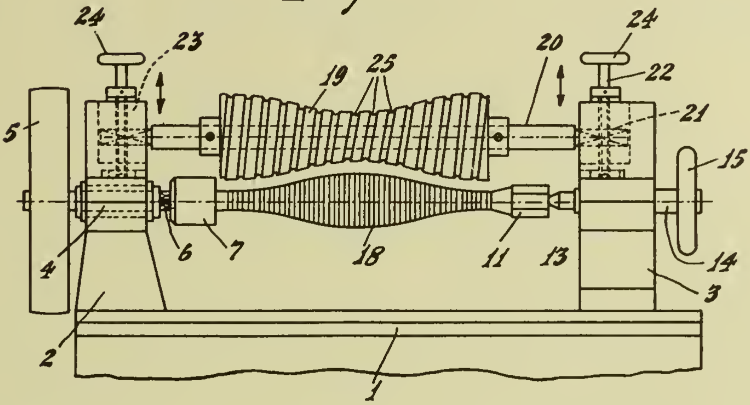


Fig. 2.

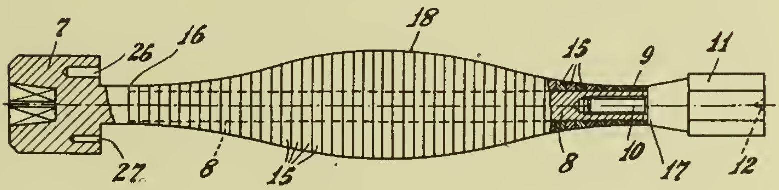
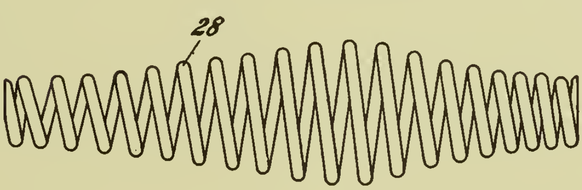


Fig. 3.



Inventor
Hendrikus Knoop
by Moses & Nolte
His Attorneys

Published May 11, 1943

Serial No. 400,471

ALIEN PROPERTY CUSTODIAN

SELF-LOCKING NUT

Ernst Rüdiger, Berlin, Germany; vested in the Alien Property Custodian

Application filed June 30, 1941

The invention relates to a self-locking nut, particularly a rivetting-on nut, which is rivetted on to one of the parts to be screwed together, and into which the screw bolt is screwed.

The object of the invention is to provide a self-locking nut, in which the surface protection of the threads cannot be destroyed, and in which the locking action is not affected, even if the screw bolts are taken out ever so often. Another object of the invention is to considerably increase the safety of the locking action as compared with the known types of nuts with friction-locking.

These problems are solved by the present invention by providing in the body of the nut an opening in the shape of an annular groove with approximately wave-shaped locking grooves running in axial direction, and an S- or Z-shaped locking spring mounted in the opening, the legs of the spring engaging the locking grooves with projections shaped according to these grooves, whereas the central portion of the spring is adapted to enter an axial slot in the screw bolt so that the projections of the legs of the spring are easily drawn over the locking grooves when the screw bolt is tightened, but have to overcome the resistance of the extending action of the spring when the screw bolt is loosened.

A constructional example of the subject of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 shows a part of a screw bolt with the thread;

Fig. 2 shows a rivetting-on nut in longitudinal section;

Fig. 3 is a cross section on the line *a*—*b* of Fig. 2; and

Fig. 4 is a corresponding section through an ordinary hexagon nut **3***a*.

The screw bolt **1**, having any desired type of head, is provided at its lower end with an axial slot **2**. The rivetting-on nut **3** has an opening **4** behind the thread, in which opening axial locking grooves **5** are arranged in a circle. A locking spring **6**, which is S-shaped in case of a right-handed thread and Z-shaped in case of a left-handed thread, is brought with projections **8** at its legs **7** to engage the locking grooves **5**. Therefore, the legs **7** of the locking spring **6** lie in the screwing direction. The locking spring **6** consists of a steel or brass spring wire of preferably round cross section and is flexible in its centre.

The locking of the rivetting-on nut is effected in such a manner that the locking spring **6** is slightly bent outwards in its central portion by the advancing screw bolt **1** until the slot **2** of the screw bolt **1** catches the spring **6**. When the turning of the screw bolt **1** is continued, the locking spring **6** is carried along and is moved with its projections **8** over the locking grooves **5**. The length of the thread of the screw bolt **1** is so dimensioned that the bolt can only be screwed into the nut up to a certain depth so as not to destroy the locking spring **6**. The resistance is smaller when the bolt **1** is screwed in, because the projections **8** are easily drawn over the locking grooves **5**. whereas, on loosening the screw bolt **1**, a considerably greater resistance has to be overcome, because the projections **8** now have to be pushed out of the locking grooves **5**, which action is restrained by the opposite extension of the legs **7**, but may be effected with the aid of an ordinary screw spanner or screw driver. Therefore, the screw connection cannot loosen by itself.

It is within the scope of the invention, in case of nuts made of light-weight metal or other soft materials, to provide the locking grooves in a special ring of harder material inserted in the nut, in order to obtain better wearing properties of the locking grooves.

ERNST RÜDIGER.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

E. RÜDIGER
SELF-LOCKING NUT
Filed June 30, 1941

Serial No.
400,471

Fig. 1

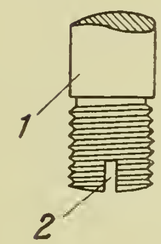


Fig. 2

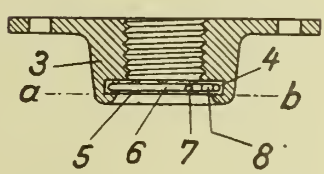


Fig. 3

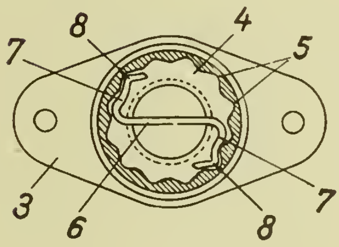
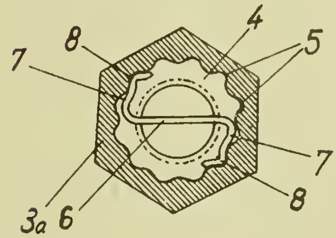


Fig. 4.



Inventor:
Ernst Rüdiger
By [illegible]
Atty.

Published May 11, 1943 Serial No. 400,816

ALIEN PROPERTY CUSTODIAN

OPERATING MECHANISM FOR CLUTCHES

Richard Lang, Ravensburg, and Karl Maybach, Friedrichshafen, Germany; vested in the Alien Property Custodian

Application filed July 2, 1941

Our invention relates to operating mechanisms for clutches and has special reference to double-acting clutches as they are often used in change speed gears of motor vehicles. In many cases such clutches are operated by means of fluid pressure and springs are provided which are set under tension, such tension vanishing only after the shifting of the respective clutch member was performed.

Generally such operating mechanisms are used in change speed gears of big motor cars having many different speeds and because of the large dimensions of such mechanisms it is difficult to have sufficient space for them as they make the entire transmission bulky and complicated.

Our invention simplifies these conditions as it makes possible to provide the springs to be tensioned without affording additional space, so that even greater spring forces are allowable, if desired, than usual.

According to our invention, the spring or springs are placed inside of the fluid pressure cylinder and are situated between the member (piston) on which the pressure fluid presses and the member which acts on the shiftable clutch element. The arrangement is so that on the first member being moved by fluid pressure the second member remains at rest—the spring being further compressed—until special circumstances allow for the second member to move also, whereby the tension of the spring is reduced again.

It is advisable, according to our invention, to provide a rod connected with the shiftable clutch member and to have two piston halves inside of the fluid pressure cylinder, said piston halves being slidably mounted on said rod. The rod has two fixed stops against which the spring or springs bears or bear, preferably by means of rings.

Our invention is applicable to simple or to double acting claw clutches as well as to shiftable gears. It is also of advantage with claw couplings having synchronising devices.

Having given a general description of our invention we now want to point it out more in detail having reference to the drawings which represent several examples embodying our invention.

Figs. 1, 2 and 3 relate to one example, showing different positions of the members and elements. Fig. 4, Fig. 5, Fig. 6 and Fig. 7 show four other examples. Fig. 8 represents a preferred construction of the tightening surfaces between the spaces separated by the piston, on enlarged scale.

In all of the Figs. the operating mechanism is shown in longitudinal section.

In the gear casing 1 shaft 2 is situated on which gears 3 and 4 are loosely journaled. Sleeve 5 is splined to shaft 2 and adapted to be shifted longitudinally thereon so that claw teeth 6 and 7, alternately, may get into engagement with claws 8 and 9, respectively, provided on the side faces of gears 4 and 3, respectively. Double-armed lever 19/18 serves for shifting sleeve 5. The lower end of this lever is connected to rod 17 to which the two halves 16 and 16′ of a piston belong which is adapted to slide inside of fluid pressure cylinder 15. Piston rod 17 has stops 25 and 26 adapted to slide tightly inside of adequate borings in piston halves 16 and 16′, respectively. There are rings 27 and 28 slidable on rod 17 between stops 25 and 26, against which the ends of spring 30 are bearing. Fluid pressure conduits 31 and 32 are adapted to allow pressure fluid to enter cylinder 15 alternately from one or the other side, so as to shift piston halves 16 and 16′ to the right or to the left and back again, as circumstances may afford. The control valve for the pressure fluid is not represented.

In the positions represented in Fig. 1 gear 3 by means of claw coupling 7/9 is connected to shaft 2. If it is desired to disengage this connection and to cause gear 4 to be connected to shaft 2 instead of gear 3, sleeve 5 must be shifted to the right so as to cause engagement of claw coupling 6/8. For this purpose it is necessary to cause pressure fluid to enter cylinder 15 through conduit 32 and to allow for the pressure fluid to the left of piston half 16 to escape through conduit 31. Thus, piston half 16′ moves to the left, presses on piston half 16, and both halves together move to their left hand end position. As during this time the side faces of the claws of coupling 7/9 are still transmitting a turning moment this coupling will not disengage and sleeve 5 will not move, so that lever 19/18 and rod 17 still rest in the position represented in Fig. 1 while the piston halves 16 and 16′ have already reached the position shown in Fig. 2. Consequently, spring 30 is under additional tension, as ring 27 bearing against stop 25 remains at rest whereas ring 28 is shifted to the left by piston half 16′.

As soon as the side faces of the claws of clutch 7/9 are released, for example by taking the gas off the engine to which the change speed gear—part of which is shown—belongs, the enlarged pressure of spring 30 will cause disengagement of clutch 7/9 and move sleeve 5 to the right until the front faces of the claws of clutch 6/8 get into touch. This position is shown in Fig. 2.

When the claw teeth have come to a mutual position in which teeth and gaps allow for engagement of clutch 6/8 spring 30 will cause sleeve 5 to move further to the right and thus cause engagement, after which the position shown in Fig. 3 is reached.

In similar manner the re-engagement of coupling 7/9 is attainable by allowing pressure fluid to escape through conduit 32 while pressure fluid is fed through conduit 31.

In the example represented in Fig. 4 conditions are similar to the first example, only one flat piston 40 is made use of instead of piston halves 16 and 16'. This makes it necessary to provide two springs 41 and 42 which are situated between piston 40 and stops 43 and 44, respectively.

In the examples described above the springs 30, 41 and 42 are assumed to be compression springs, whereas in the example shown in Fig. 5 spring 50 is a tension spring. The middle portion 51 of rod 17 is made with a larger diameter, and the rings on the rod 17 are shaped into sleeves 52 and 53 having collars 55 and 56, respectively, bearing against the front faces of piston 54.

Fig. 6 is still another example in which piston 60 has a cylindrical projection 61 inside of which compression springs 62 and 63 are situated, separated by double-acting stop 64.

In the example represented in Fig. 7 a diaphragm 70 is used on which the fluid pressure is brought to act. The casing 71 is adequately shaped and the diaphragm in its centre portion is connected to a cylindrical member 72 surrounding the spring 75 which bears against rings 73 and 74. The path of these rings sliding on the thinner middle portion 78 of rod 17 is limited by stops 76 and 77 shaped on the rod at the spots where the diameter changes from the thinner middle portion to the thicker main portions.

Fig. 8 represents a detail on an enlarged scale. The upper half of the Fig. gives one example for the shape of the tightning surfaces and the lower half is a different example. Both relate to the construction as represented in Figs. 1, 2 and 3.

It is important that the pressure fluid should not leak through between the rod 17 or the stop 26 and the ring 28, which may happen when the entire device is made small, so as to save in space, and the spring 30 is weak. It then becomes possible that the pressure on the ring 28 causes this ring to move away from the bottom of piston 16' which should be avoided. Therefore, the tightening surfaces a/b and c/d, respectively, are made comparatively narrow so that the specific tightening pressure is very high.

RICHARD LANG.
KARL MAYBACH.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

R. LANG ET AL

OPERATING MECHANISM FOR CLUTCHES

Filed July 2, 1941

Serial No.
400,816

4 Sheets-Sheet 1

Fig.1

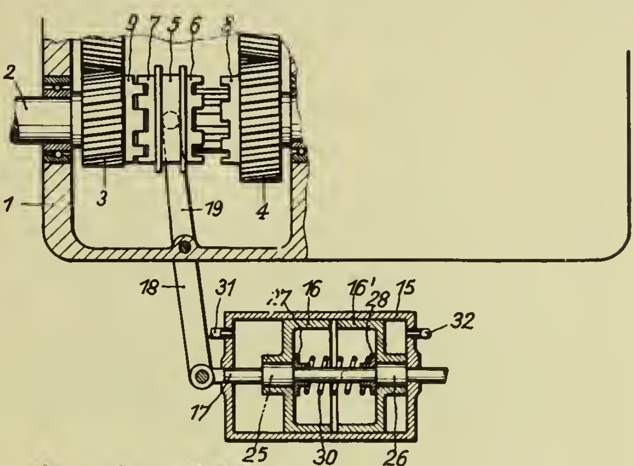


Fig.2

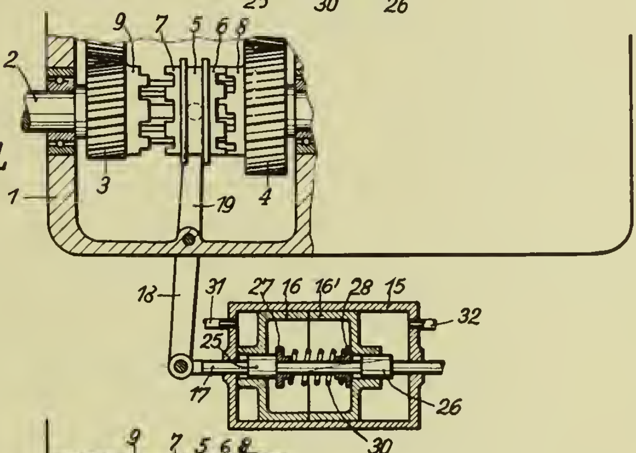
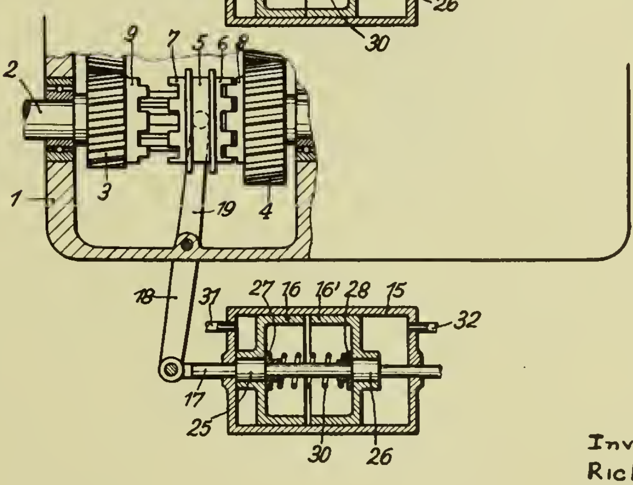


Fig.3



Inventors:
Richard Lang
Karl Maybach

By Edmund H. Parry
Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

R. LANG ET AL
OPERATING MECHANISM FOR CLUTCHES
Filed July 2, 1941

Serial No.
400,816
4 Sheets-Sheet 2

Fig. 4

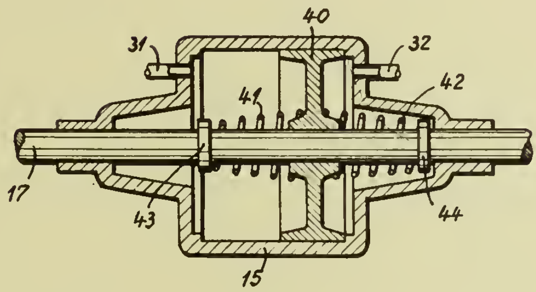
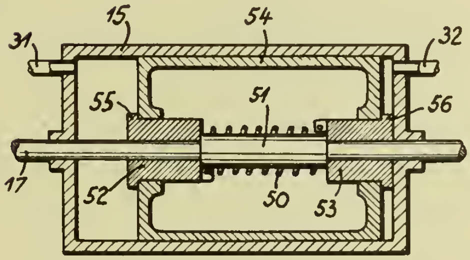


Fig. 5



Inventors:
Richard Lang
Karl Maybach
By Edmund W. [signature]
Attorney

PUBLISHED	R. LANG ET AL	Serial No.
MAY 11, 1943.	OPERATING MECHANISM FOR CLUTCHES	400,816
BY A. P. C.	Filed July 2, 1941	4 Sheets-Sheet 3

Fig. 6

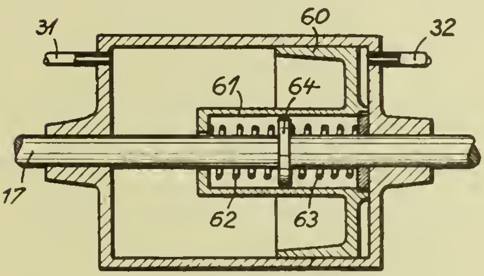
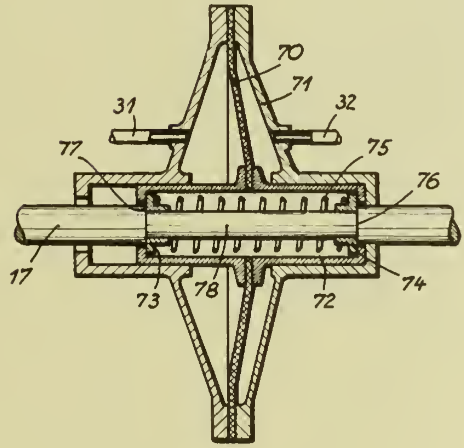


Fig. 7



In.entors:
Richard Lang
Karl Maybach

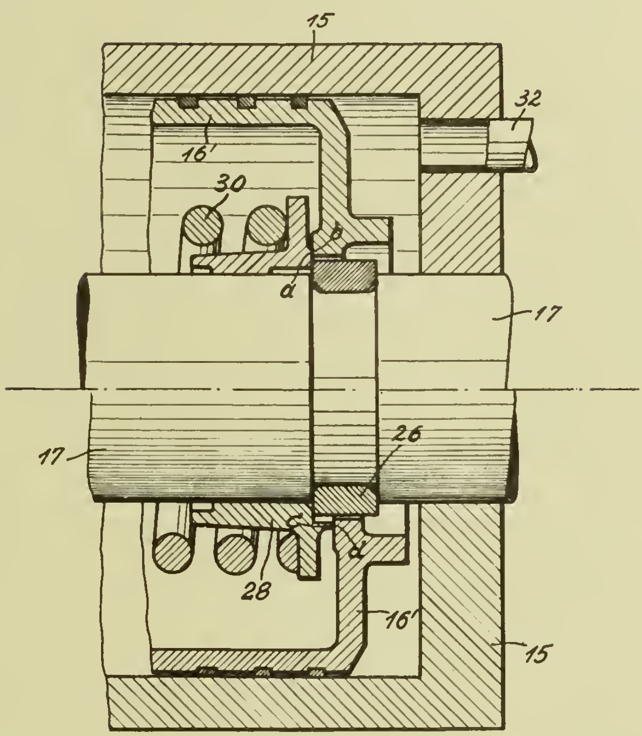
By Edmund W. Pugh
Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

R. LANG ET AL
OPERATING MECHANISM FOR CLUTCHES
Filed July 2, 1941

Serial No.
400,816
4 Sheets-Sheet 4

Fig. 8



Inventors:
Richard Lang
Karl Maybach
By Edmund W. Pavelh
Attorney

Published May 11, 1943

Serial No. 401,123

ALIEN PROPERTY CUSTODIAN

BANDAGE FOR WOMEN

Frederik Carsten van den Bergh, Nijmegen, Holland; vested in the Alien Property Custodian

Application filed July 5, 1941

My invention relates to bandages for women mainly consisting of cotton, cellulose of similar materials in the form of wadding surrounding, if desired, by a thin network of gauze or another tissue.

The known bandages of this kind generally show two disadvantages. In the first line they fit very inconveniently owing to their thickness. In the second place such bandages can difficultly be brought in the form of a small packing easily to be carried along, which is particularly troublesome in a journey. Some manufacturers tried to overcome this latter objection by packing bandages in folded-up state into small packages, but even in these cases remained the first and principal objection, in that the travelling-bandage drawn out of said small packet still had the same thickness as a bandage packed in the usual manner.

According to this invention I have succeeded in overcoming these and other objections by making the bandage up of a number of layers, compressed to thin dimensions, of cotton, cellulose of other vegetable fibres in the form of wadding, as they are known for instance made of cotton for use as melk-filters.

From prior publications relating to surgical appliances compositions of a number of layers appear to be known (see e. g. British Patent 299,095 which shows cellulose wadding in gauze), while other publications disclose to compress vegetable fibres (see e. g. German Patent 52,236 which shows compressed wadding in gauze). Therefrom does not result, however, the combination of both these features which just in application to a bandage for women produces a particular advantage.

By strongly compressing suitable vegetable wadding it can be attained that the bandages can be worn with less inconveniency, but the adsorptive capacity is simultaneously reduced thereby and the thin layer obtained is too hard and thus not sufficiently supple. When a layer of compressed material such as compressed cellulose of compressed crepe paper was provided in a bandage, the upper layer was therefore always made of a loose material having a great adsorptive power (see e. g. U. S. Letters Patent 1,863,-333).

These disadvantages can be overcome according to the discovery underlying the present invention, that the vegetable waddings possess such an elasticity that the absorptive capacity is substantially retained if they are compressed not too strongly, while by joining a number of such layers, a combined correspondingly thin layer can be obtained which moreover is much suppler than a layer of the same mass if compressed as a whole to the same thickness. Due to thus increased suppleness much less inconveniency is experienced in using such a bandage, which in addition thereto can easily be folded up and packed in very small dimensions.

Example: Layers of cotton wadding with a weight of 30 to 50 grams per square meter are compressed with a pressure of 1 to 5 atmospheres to layers having a thickness each of about 0.25 mms. By joining 10 to 15 of such layers in superposition of final thickness of 2.5 to 4 mms. can be obtained which in comparison with the dimensions of thickness hitherto used in bandages is much more agreeable, while the suppleness is considerably greater than can be obtained by compressing, with the same pressure, the same quantity of material in the form of a single layer.

The drawing affixed to this specification and forming part thereof illustrates an embodiment of the invention diagrammatically by way of example.

The drawing shows partly and in cross section several of the superposed layers *a*, which form the main part of a bandages for women according to the invention.

I do not wish to be limited to the specific embodiments or details disclosed in this specification merely for illustrating the invention, since modifications and changes obvious to persons skilled in the art fall in the scope of the invention.

FREDERIK CARSTEN VAN DEN BERGH.

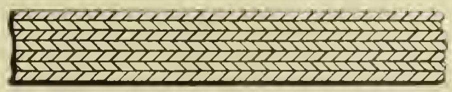
[illegible]

[illegible]

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. C. VAN DEN BERGH
BANDAGE FOR WOMEN
Filed July 5, 1941

Serial No.
401,123



INVENTOR:
Frederik Carsten van den Bergh
BY
Mitchell & Mitchell
ATTORNEYS.

Published May 11, 1943

Serial No. 401,974

ALIEN PROPERTY CUSTODIAN

WEED-DESTROYING PREPARATIONS

Herbert Schotte, Berlin-Charlottenburg, and Robert Ebert, Berlin-Halensee, Germany; vested in the Alien Property Custodian

No Drawing. Application filed July 11, 1941

This invention relates to preparations for destroying weeds, and more particularly to a weed-destroying agent for use in cultures and fields.

Various compounds on the basis of nitrophenols have already been suggested for combatting insects and the like. But only dinitrophenol and its homologues have found application in practice. These compounds serve not only for combatting animal pests but have been used also for destroying or checking the growth of obnoxious plants such as weeds.

These dinitrophenols have attained an especially highly regarded position as insecticides. But above all they have proved to be excellent agents for destroying weeds; for they represent highly active poisons for the plasma. Said effects are not to be attained with any of the hitherto known mono-nitro-compounds.

Now, according to this invention a mononitrophenol, the 2,6-dichloro-4-nitrophenol, has shown to possess weed-destroying properties which in every respect reach or even partly surpass those of the dinitrophenols. It shows an excellent weed-killing effect and in this point considerably surpasses the copper salts, which have been mostly used for this purpose till now. On spraying a 0.2% suspension of this compound against Sinapis arvensis, Raphanus raphanistrum or other weeds capable of being readily wetted, already after one to two hours the first marks of burning can be observed on the leaves of the weeds. One day after spraying they are completely withered and destroyed while the cereal plants do not show any damage. When applying dinitro-o-cresol for the same purpose in order to save copper, these effects take place under most favorable conditions only one day after spraying. Besides, this compound frequently does not accomplish the desired effect with certainty. Other mono-nitro compounds used in concentrations mentioned above are even less effective than dinitro cresol and do not show at all the effects of 2,6-dichloro-4-nitrophenol. This is true also with the isomeric 2,4-dichloro-6-nitrophenol. Only 2-chloro-4-nitro-phenol stands with regard to its herbicidal activity between dinitro-o-cresol and 2,6-dichloro-4-nitrophenol, but especially in cool weather it is still considerably surpassed by the latter.

Furthermore it was found, that 2,6-dichloro-4-nitrophenol can be dissolved without any loss of activity when first converting it into the urea double compound. In order to secure better solubility, it is advisable to use an excess of urea. A readily soluble and fully effective preparation is obtained by combining 1 part of 2,6-dichloro-4-nitrophenol with 2,5–4 parts of urea. The combination may be carried out by melting or still better by heating in the presence of a small amount of water. The most favorable method of making said preparations is the following:

1 part of 2,6-dichloro-4-nitrophenol, 3 parts of urea and 3 parts of water are heated while stirring until solution takes place. The compound crystallizing on cooling, is water soluble in concentrations of 1–2%, as they are used for spraying.

Apart from the fact that for the first time a mono-nitro compound was obtained which reaches the effectiveness of the dinitrophenols, the application of 2,6-dichloro-4-nitrophenol and its salts furthermore has the following advantages:

(1) The compound itself, its salts and its urea double compound are not explosive; thus there is no need of selling them on the market in the form of a paste which still might explode on becoming dry.

(2) The yellow color of said compounds is not at all as intensive and fast as that of the dinitro compound and may be removed much more readily from clothes and skin by washing.

Of course, it is possible to employ the compounds claimed in any other form and concentration than described above. Furthermore wetting agents and other customary ingredients may be added to the preparation.

HERBERT SCHOTTE.
ROBERT EBERT.

Published May 11, 1943 | Serial No. 404,526

ALIEN PROPERTY CUSTODIAN

DEVICE FOR MAINTAINING CONSTANT PRESSURE IN CONDUITS OR RESERVOIRS FILLED WITH LIQUIDS OR GASES

Rudolf Kleeberger, Munich, Germany; vested in the Alien Property Custodian

Application filed July 29, 1941

The invention relates to a device for keeping constant a predetermined pressure in conduits or reservoirs filled with liquids or gases.

Very frequently the demand will raise to maintain liquid or gas pressure in a system of conduits or the like at a predetermined constant amount. In lubricating internal combustion engines, e. g., which is generally operated by means of an oil pump supplying oil under considerable pressure and in an excessive quantity from a storage reservoir of the engine or from a separated tank to the single oiling points, either the whole quantity delivered is pressed through the oiling points or, as frequently usual, will in part be returned through a relief valve directly to the reservoir. This relief valve will in most cases be designed as a spring-loaded valve, the initial spring tension of which may be adjusted to a certain amount. This relief valve is to keep up, with all the working conditions of the engine, a predetermined oil pressure, respectively, to preserve the system of conduits from excessive pressures. It is generally usual to apply, particularly in lubricating systems provided with oil coolers, relief valves so as to preserve the relatively delicate oil cooler from too high pressures as caused, e. g., with the engine still being cold by the viscous oil, and to obtain a constant oil pressure before the cooler, as the pressure drop on the side of the oil is essential for the cooling capacity of the cooler.

However, the springloaded relief valves generally applied up to this time show the disadvantage that oil pressure cannot be maintained constant at a predetermined adjusted amount, but that the pressure effectively resulting in the system of conduits depends upon the quantity of discharge overflowing for a given moment through the relief valve. Yet, the overflowing quantity itself very often changes during operation and is dependent on the existing number of revolutions of the engine and the viscosity of the lubricating oil. The mentioned disadvantageous dependence of the pressure on the overflowing quantity results from the characteristic of the spring with which the valve is loaded and the force of which increases when being compressed more and more.

It is the object of the present invention to eliminate those shortcomings subsistent in the known relief valves and to realize a device which though allowing a simple and clear structure guarantees the maintaining of a predetermined adjusted pressure in the system of conduits.

In the mechanism according to the invention there is provided between the space in which pressure is to be kept constant and the return conduit leading, e. g., to the storage reservoir a main valve preferably designed as a sliding piston and on both sides of which pressure means is admitted and the surfaces of admittance of which are of different sizes. The pressure chamber arranged on the side of the larger surface of admittance communicates through a port with the proper pressure reservoir. There is further provided, according to the invention, a particular auxiliary valve which, preferably, is likewise designed as a sliding piston and on one side of which liquid or gas from the pressure tank is admitted whilst the other side of which is exposed to a predetermined adjustable pressure, e. g. to that of a spring, said auxiliary valve controlling a conduit which leads from the pressure chamber situated on the side of the larger face of admittance of the main valve to the return conduit.

By means of the device according to the invention, as tests proved, exact maintenance of a predetermined adjusted pressure in the conduit or the pressure tank is, at all events, obtained and that independently on the quantity which passes at a given moment and the viscosity of the applied liquid.

In the annexed drawing examples of construction of the device have been represented according to the invention.

Fig. 1 shows a section through a form of embodiment of the device according to the invention.

Figs. 2, 3, 4 and 5 show a further form of embodiment of the device according to the invention, Fig. 2 representing in a fragmentary section a side view of it, and Fig. 5 a top view with its closing cap being removed.

Figs. 3 and 4 represent sections according to lines A—B respectively C—D of Fig. 5.

In all figures corresponding parts designated by the same reference characters.

In the following, the manner of action of a device according to the invention will, by means of Fig. 1, be described. The space in which pressure of a liquid or gas is to be kept at a predetermined constant amount is indicated by **1** and the return conduit leading, e. g., to a storage reservoir by **2**. In the casing **3** there is mounted, capable of longitudinal motion, a piston **4** which forms the main valve and comprises an annular cone-shaped faying surface **5**. Casing **3** is closed pressure proof by a cap **6**. The pressure chamber **7** formed hereby above piston **4** communicates through a port **8** in the casing with the proper pressure reservoir **1**. A further piston **9** which

forms the auxiliary valve is mounted longitudinally slidable in piston 4 and is pressed downwardly by a pressure spring 10 the initial tension of which is adjustable by screw 11. The pressure of liquid or gas existing in space 1 propagates through port 8 into pressure chamber 7: Piston 4, therefor, is acted upon on both sides by the same pressure; the surface of admittance of the piston situated on the side of the pressure chamber 7 being, however, larger than that directed towards the pressure reservoir 1, the piston will be depressed and seal by means of its annular surface 5 with a corresponding faying surface on the casing. Fluid under pressure will be admitted, likewise, to the auxiliary piston 9 from pressure reservoir 1. On exceeding, in space 1, a predetermined amount of pressure which is proportioned by the initial tension of spring 10, auxiliary piston 9 is moved upwardly opening a port 12 bored in piston 4, which port leads from pressure chamber 7 to return conduit 2. The cross-section of this port 12 is larger proportioned than that of port 8 whereof pressure drop results in pressure chamber 7 compared to pressure in space 1, which decrease of pressure will have the result of the main piston 4 moving upwardly thus causing the pressure fluid in space 1 to discharge into the return conduit. When pressure has dropped in space 1 the auxiliary valve closes under the influence of the pressure spring 10 port 12, and main piston 4 will move downwardly again and close the pressure reservoir 1 off the return conduit, respectively it will leave open a certain slot, so as to establish a state of equilibrium. In this way as just described a predetermined constant pressure is maintained in the pressure reservoir 1. To be able to mount the device according to the invention also in a reverse position it is of use to arrange between piston 4 and casing cap 6 a pressure spring the effect of which will be to press, in a state of no-pressure of the apparatus, piston 4 with its faying surface 5 on the corresponding faying surface of the valve box, thus the piston not tending to move by its won weight into the opposed extreme position. The pressure spring may be proportioned but very weak, the spring therefor being of no influence on the operation of regulation of the device.

The example of construction, shown in Figs. 2, 3, 4 and 5, of the subject of the invention has the same spirit of invention as its basis, the manner of action being the same, too, as with the device according to Fig. 1. Only the port of communication provided between pressure tank 1 and pressure chamber 7 has been displaced for simplification into piston 4, and the complete apparatus according to the invention is constructed in form of an insertion apparatus easily to be mounted.

RUDOLF KLEEBERGER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

R. KLEEBERGER

DEVICE FOR MAINTAINING CONSTANT PRESSURE IN CONDUITS OR RESERVOIRS FILLED WITH LIQUIDS OR GASES

Filed July 29, 1941

Serial No.

404,526

Fig. 1

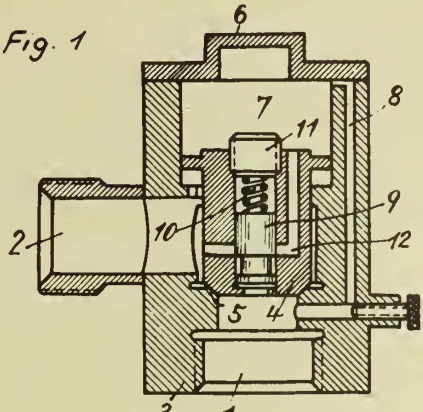


Fig. 2

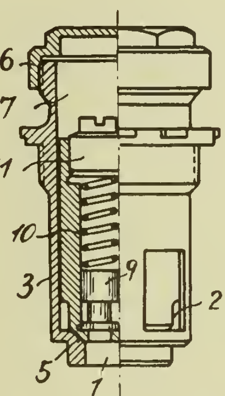


Fig.3

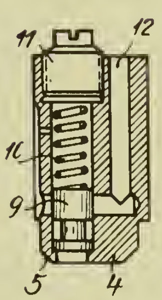


Fig.5

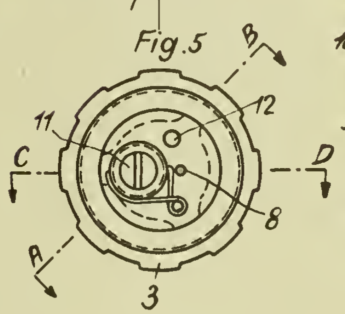
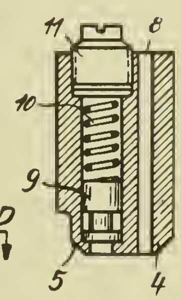


Fig.4



INVENTOR:

RUDOLF KLEEBERGER

by A. A. Wicke [signature]

ATTORNEYS

Published May 11, 1943

Serial No. 405,261

ALIEN PROPERTY CUSTODIAN

SYRINGE FOR MEDICIAL PURPOSES

Franz Lautenschläger, Berlin-Nikolassee, Germany; vested in the Alien Property Custodian

Application filed August 2, 1941

Hitherto, syringes for medical purposes, for example injecting syringes and the like, have been sterilized by taking to pieces the syringe, the parts of which, i. e. the cylinder with the short canula on the one hand and the piston with the rearward cylinder lid on the other hand, being separately sterilized in steam. This manner of sterilizing has the disadvantage that, in spite of taking to pieces the syringe, not all important parts of the syringe are reliably sterilized. In addition, when reassemblying the sterilized parts of the syringe, there is the danger of reinfecting it.

The present invention is based upon the fundamental idea of sterilizing the syringe in its assembled state, but to loosen the parts of the syringe in such a manner that the steam is given free access to all parts of the syringe coming into contact with the liquid to be injected. For this purpose, the invention provides at the front end of the cylinder for fixing the short canula a perforated cap nut, which is screwed on to the glass cylinder or its protective tube, and which, when being loosened, draws the short canula out of the glass cylinder, whereas at the rear end of the cylinder there is provided a widened and likewise perforated extension of the protective tube or of the glass cylinder, into which extension the piston of the syringe may be drawn completely.

Two constructional examples of the invention are illustrated in the accompanying drawing, in which:

Fig. 1 is a view of an injecting syringe, one half of which is shown in longitudinal section;

Fig. 2 is the same injecting syringe with the parts of the syringe loosened when being sterilized;

Fig. 3 is a sectional view of the rear end of an injecting syringe in a somewhat different construction; and

Fig. 4 is a section on the line IV—IV of Fig. 3.

The syringe illustrated in Fig. 1 is composed of the following parts:

A glass cylinder 1, a protective tube 2 made of metal and surrounding said cylinder, a piston 3 with a piston rod 4, and a short canula 5 which is fixed by means of a cap nut 6 screwed on to the tube 2.

As will be seen from Fig. 1, the liquid to be injected, which is contained in the cylinder 1, may, owing to the capillary action, also get between the cylinder 1 and the short canula 5. Since the short canula 5 was hitherto rigidly connected with the cylinder 1 while being sterilized, there was the great danger of the short canula not getting sterilized at the place 7.

According to the invention, the arrangement is made so that, when loosening the cap nut 6, the short canula 5 is at the same time drawn out of the glass cylinder, as shown in Fig. 2. This automatical withdrawing of the short canula may be constructively effected in various manners. In the constructional example illustrated, an adjustable nut 8 is provided on the short canula, against which nut bears the cap nut 6 as in Fig. 2 and, therefore, draws the short canula out of the glass cylinder and lifts it off the latter far enough to let the sterilizing steam enter the cylinder 1 through openings 9 in the cap nut 6 in the direction of the arrows. Consequently, the above mentioned place 7 of the short canula is also sterilized in a perfect manner.

In the advantageous construction illustrated, the cap nut 6 has two spaced thread pieces 10 and 11, between which the perforations 9 are arranged. This construction facilitates a rapid loosening of the cap nut on the protective tube 2. Besides, the thread piece 11 is so arranged that, after loosening the thread 10, the short canula 5 may be securely drawn out of the glass tube, as shown in Fig. 2. If desired, there may be provided a stop or the like, which prevents the cap nut from being completely screwed off. It is important that this cap nut is merely loosened, but not completely screwed off.

In order to be able to perfectly sterilize the piston 3 of the syringe together with the syringe, the invention provides at the rear end of the cylinder an extension 13 of the protective tube with perforations 12, into which extension the piston may be drawn completely, as shown in Fig. 2. Consequently, the sterilizing steam can flow on all sides round the piston, as indicated by arrows.

Furthermore, there is provided on the extension 13 of the protective tube an adjustable stop for the piston, which stop prevents the piston from being accidently drawn out of the glass cylinder. In the construction shown in Figs. 1 and 2, this stop consists of a threaded tube 14 serving to guide the piston rod 4, which threaded tube may be screwed in a projection 15 of the extension 13.

In the construction shown in Figs. 3 and 4, the extension 13 of the protective tube 2 is a part of the protective tube 2, both together forming one single piece. At the place 16 there is a bead serving as a stop for the glass cylinder 1. This bead may also be used for inserting a spring 17, which is fastened to the tube 2 by soldering or

the like, and whose movable portion 18 projects into the protective tube in such a manner that the piston rod 3 cannot be pushed past. When the piston in the glass cylinder 1 is to be drawn out of the cylinder into the position shown in Fig. 3, it is necessary to first press the arm 18 of the spring in the direction of the arrow out of the protective tube. This is also necessary when the piston, in its position shown in Fig. 3, is to be pushed back into the glass cylinder. In the construction according to Fig. 3, a lid 19 is screwed on to the extension 13, which lid has a guide 20 for the piston rod 4.

In the syringe according to the invention, the scale 21 for indicating the contents is arranged on the glass cylinder in such a manner that it may be read at the rear end of the piston. This has the advantage that the reading is more accurate, and in addition, it makes it possible to make the syringe shorter.

In order to securely prevent a reinfection of the sterilized syringe when fixing a canula, by touching the short canula at 22, a protective cap 23, which is pervious to steam, is passed over the short canula.

The syringe described above is preferably sterilized in vertical position, advantageously in the position illustrated in Fig. 2. During this operation, the syringe may be suspended by means of a fork or the like, supporting the syringe under the edge 24 of the cap nut 6.

The invention is not limited to the above described construction of a syringe. If desired, the syringe may be made without a protective tube or substantially of glass. In this case, the extension 13 shown in Fig. 3 and the glass cylinder would consist of one piece and the extension would be a widened portion of the glass cylinder.

FRANZ LAUTENSCHLÄGER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

F. LAUTENSCHLÄGER

SYRINGE FOR MEDICAL PURPOSES

Filed Aug. 2, 1941

Serial No.
405,261

FIG. 2.

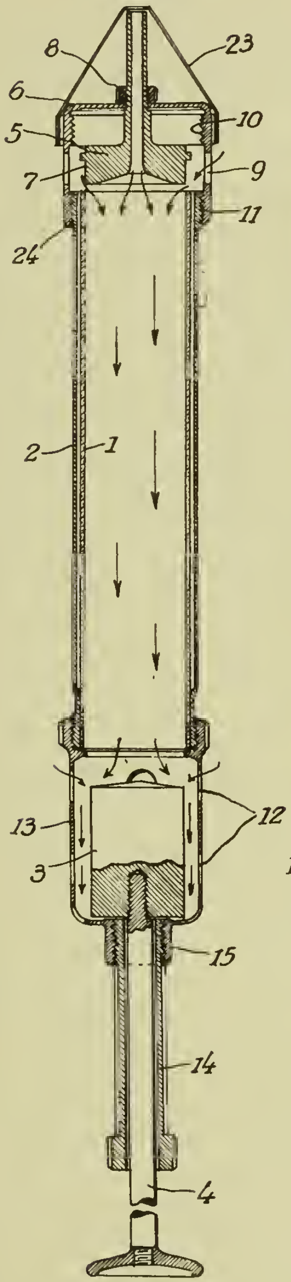


FIG. 1.

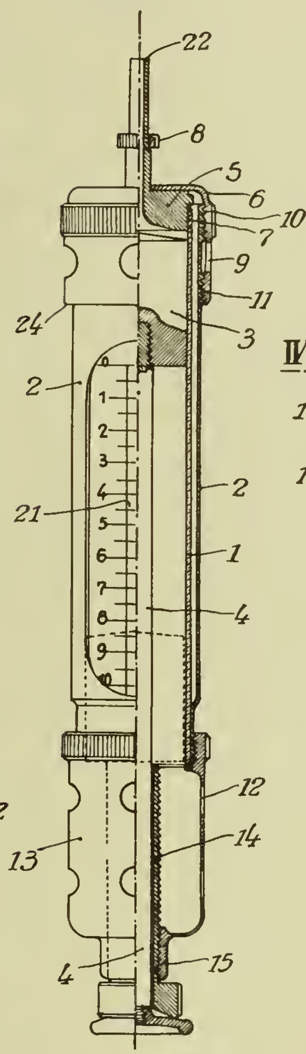


FIG. 3.

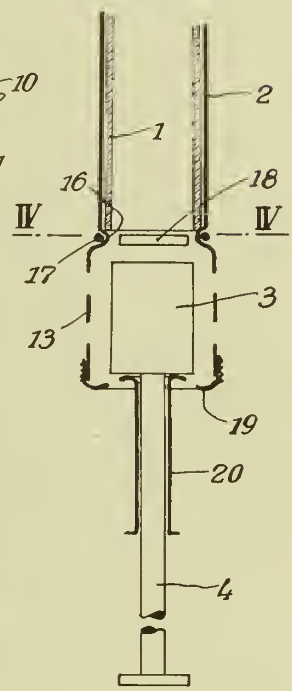
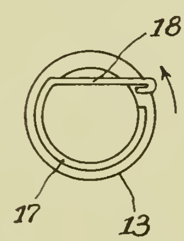


FIG. 4.



Inventor
F. Lautenschläger

By
Glascock Downing & Seebold

Attorneys

Published May 11, 1943

Serial No. 407,661

ALIEN PROPERTY CUSTODIAN

BED SETTEES OR CHAIRS

Antoon Mattheus de Nachtegaal, Scheveningen, The Hague, Netherlands; vested in the Alien Property Custodian

Application filed August 20, 1941

The present invention relates to bed settees or chairs i. e. an adjustable chair, settee or the like piece of furniture, which by adjustment, particularly by extending the seat portion, may be converted into a bed, lounge or the like structure.

The object of the invention is to provide an improved bed settee or chair of the kind referred to, which in either condition of use fully answers the purpose thereof, permits of a prompt and easy conversion from one condition into the other, does not impose any limitation on the design of the settee, chair or the like as such, and allows of a light construction of the entire structure, so that it is specially adapted for use in air craft.

With these objects in view, the invention consists in a bed settee or chair of the kind referred to, in which the seat is constituted by a unitary or composite web of flexible material, which in its entirety is of greater length than the seat portion proper and which, with its longitudinal edges being guided in seat frame and seat extension member, is adapted to be pulled through, to thereby convert the seat portion into a bearing surface of sufficient length to enable the structure to be comfortably used as a bed, lounge or the like.

According to a further characteristic feature of the invention the guide tracks for guiding the lateral edge portions of the flexible web may be continued in the back frame of the chair, settee or the like and, if desired, may be turned back about the upper end thereof, thereby to enable the portion of the web, serving to complete the seat portion to a lying surface, when converting the settee, chair or the like into a bed structure, to be normally accommodated within the back frame so as to function as the back of the settee, chair or the like, whereby special means for providing and accommodating such complementary web portion may be omitted.

According to an embodiment of the invention the back frame may be hingedly attached to the seat frame in such a manner that it may be lowered into or approximately into the plane of the seat frame—in which position the guide tracks in back frame and seat frame are in line—so that by bodily shifting the web from its position in which it is turned back about the upper end of the back frame, into the position in which its front portion covers the extension of the seat frame, a complete lying surface of sufficient length can be obtained, whilst keeping the chair or the like within normal dimensions. For supporting the back frame in this lowered position, according to the invention, one or more pivotable stays may be provided which are normally let in in the side members of the back frame and held in this position by locking means.

According to a further embodiment of the invention the seat frame extension piece is constituted by members, which are hingedly connected to each other, respectively to the seat frame and in the normal condition of the structure as a chair constitute armrests, of which the horizontal portion may be detachably secured to the back frame, such members being provided with guide tracks for the flexible web, which when the arm rests are bodily swung into the position in which they constitute an extension of the seat frame, are in line with those of the seat frame. In this manner it is again obtained that the parts necessary for completing the seat to a lying surface, constitute normal parts of the settee or chair and therefore do not impair the outward appearance or character of the chair as such, and do not involve an increase of the weight of the settee, chair or the like.

Further characteristic features of the invention will become apparent from the following description, in which a few embodiments of the improved bed settee or chair are described, reference being had to the accompanying drawings.

Fig. 1 is a longitudinal sectional view of an improved bed settee or chair according to the invention, executed in wood and shown in the condition for use as a chair.

Fig. 2 is a front elevational view thereof.

Fig. 3 shows the structure in its extended position for use as a bed or lounge.

Figs. 4 to 9 inclusive show various constructional details on an enlarged scale, Fig. 6 representing a cross section along the line VI—VI in Fig. 1, and Fig. 8 a modification of the embodiment shown in Fig. 6.

Fig. 10 is a perspective rear elevational view of the structure and shows the provision of a winding device for facilitating the pulling through of the flexible web when converting the structure from one condition of use into the other.

Figs. 11 and 12 show details of this device.

Figs. 13 and 14 show a longitudinal sectional view and a front elevational view respectively of an alternative embodiment of a bed settee or chair according to the invention.

Fig. 15 shows this structure in the condition for use as a bed or lounge.

Fig. 16 shows a cross sectional view on the line XVI—XVI in Fig. 13.

Fig. 17 shows a modified form of the profile of the guide tracks.

The frame of the bed settee or chair shown in Figures 1 to 3 and 10, consists of a seat frame **1** supported by legs, a back frame **2** hingedly attached to said seat frame and two armrests each comprising a substantially horizontal portion **3** and an upright portion **4** hingedly connected thereto, such upright portion at its other end being pivotably attached to the front of the seat frame. The substantially horizontal portion **3** of each armrest is provided with a prolongation

5 adapted to be secured to the corresponding side member of the back frame by means of a readily detachable connection, which in the present case consists of a metal strip 6 (Figs. 6 and 7) covering a longitudinal slot in the under face of said prolongation and having two or more keyhole-shaped apertures 7 for accommodating knobs 8 on the back frame side member as is known per se, for instance for interconnecting the members of wooden bed frames.

The seat, respectively the lying surface of the structure is formed by a flexible web 9 of suitable material, such as canvas or the like fabric, to the longitudinal edges whereof, through the medium of small springs 10 (Fig. 6) or rubber strips 30 (Figs. 8, 9) and shackles 11 (Fig. 6) pairs of rollers 12 are secured. For supporting and movably guiding such web by means of said rollers, the frame of the structure is provided with guide tracks, which in the present case are formed by a longitudinal slot 13 formed in the frame members and metal strips 14 overlapping such slot from both sides, such metal strips being secured to said frame members, as shown in detail in Figs. 6, 8 and 9.

Similar guide tracks are formed in the inner face of both side members of the seat frame 1 and of the back frame 2, in which latter case there are provided in each side member, one behind the other, two guide tracks interconnected at the enlarged upper end of the side members by a loop-shaped portion, and also in the inner face of the horizontal and upright members of each armrest, the pivots between said various frame members being so formed (vide Figs. 4 and 5) that the respective guide tracks can be brought in line. In order to ensure exact alignment of the guide tracks in extended condition, each joint is provided with a spring urged ball locking device 42 (Figs. 4 and 5).

In the upper end of the back frame 2 the two side members of said frame are interconnected by a rod 37, carrying a freely rotatable padded roller 38 serving to ensure free and easy movement of the web when being pulled through between said guide tracks.

The front edge of the flexible web 9 is attached to a rod 15 provided at its ends with T-shaped trunnions 16 adapted to engage clamps 17 (Fig. 9) for detachably connecting the flexible web to the front of the seat frame. Similar clamps 18 are provided on the inner face of the horizontal armrest members, where same adjoin the back frame side member.

The rear edge of the web is attached to a rod 19 (Figs. 10–12) having cords 31 secured to its opposite ends, such cords being wound on a spindle 33 mounted for rotation in ears 32 secured to the side members of the frame 2, by means of a crank 36 adapted to be swung in inoperative position and to be fixed for locking the spindle against rotation by means of a plate 35 having holes formed therein and a pin 34 passing through said crank and entering one of said holes, all in such a manner that the pulling back of the flexible web when converting the structure from the condition for use as a bed into the condition for use as a chair, may be readily and uniformly effected from one side of the chair.

In the rear face of each side member of the back frame a pivotable stay 22 is let in (Figs. 6 and 10), such stays being held by a clamp or other means in the position shown in Fig. 1 and being adapted to support the back frame when lowered into the position shown in Fig. 3. A similar stay 23 for supporting the joint in the extended position of the structure is let in in the upper face of each horizontal armrest member 3 (Figs. 1 and 10).

For converting the chair into a bed structure, the arm rests after disconnecting same from the back frame, are swung forwards and downwards so that the members of the armrests are brought in line with one another and with the side members of the seat frame (Fig. 3) the prolongations 5 and stays 23 of the armrests coming to rest on the floor (Fig. 3). At the same time the back frame 2 is lowered and set upon the stays 22, the front guide tracks 13, 14 for the side members of the back frame in this position being in line with the guide tracks 13, 14 of the seat frame (Fig. 3).

Thereupon the rod 15 is removed from the clamps 17, so that the web 9 after the crank 36 has been released and brought into operative position and whilst unwinding the cords 31 from the spindle 33, is pulled through the guide tracks until the rod 15 can be positioned into the clamps 18 of the armrests, whereupon the crank 36 is again swung back in inoperative position and locked. The entire structure then constitutes a bed frame with a resiliently suspended lying surface which, if desired, may be covered with a mattress and bedding.

In Figs. 13–17 inclusive, an alternative embodiment of the improved bed settee or chair according to the invention is shown. This embodiment differs from that above-described only in so far that the frame of the structure is entirely constructed from tubes 24 forming the guide track garniture. The back frame is formed in one piece with the seat frame and therefore cannot be lowered. The tubes 24 are provided with a longitudinal slot 25 for accommodating the shackles 11 of the guide track garniture, the rollers of which run inside the tubes (Fig. 16). The construction of the armrests and their detachable connection to the back frame are identical with that of the first described embodiment.

The conversion of the chair into a bed or lounge is effected in similar manner, however, with this difference that a rod 39 attached to the rear edge of the web and normally held in place by hooks 40, after the web has been pulled through, is shifted to hooks 41 arranged at a lower level, so that the end portion of the web extends between the side members of the back frame as clearly shown in Fig. 15. It will be understood that a winding spindle and crank could also be provided in this case.

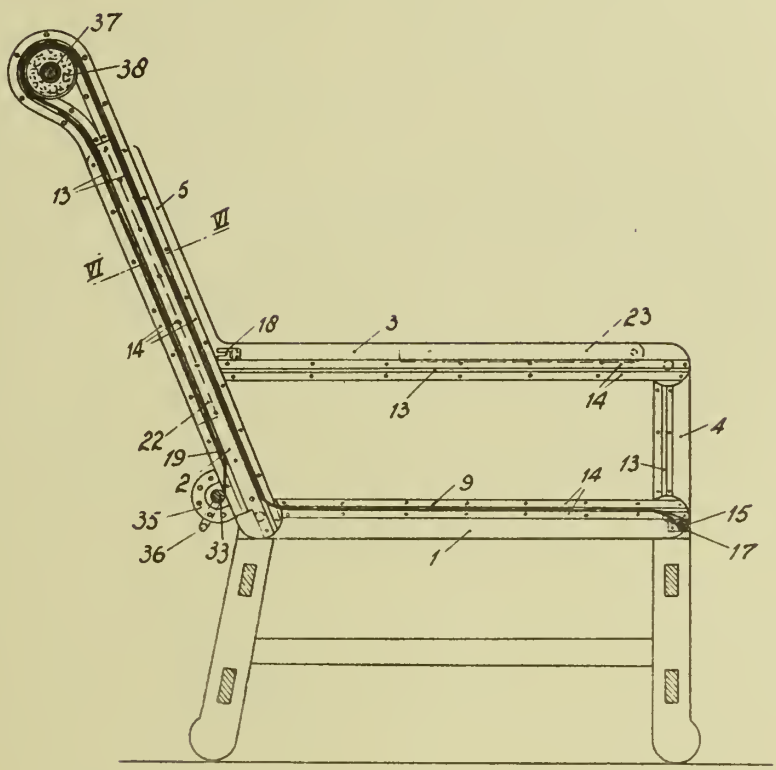
Instead of tubes, a double T or other suitable profile may also be used (Fig. 17). In that case the entire structure may be formed of profile rods of this type or such rods may be secured to the inner face of the side members of a wooden frame.

If desired, the frame of the structure may be covered with fabric or wood to thereby form an enclosed space, adapted for storing cushions, bedclothes and the like. In the embodiment shown in Figs. 13 and 16 or 17, the slot 25 is then continued into the hind legs and the web is extended so that by pulling the web through to the front, the said space is opened up at the back.

ANTOON MATTHEUS DE NACHTEGAAL.

PUBLISHED	A. M. DE NACHTEGAAL	Serial No.
MAY 11, 1943.	BED SETTEES OR CHAIRS	407,661
BY A. P. C.	Filed Aug. 20, 1941	6 Sheets-Sheet 1

FIG. 1



Inventor

By

Attorney

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. M. DE NACHTEGAAL

BED SETTEES OR CHAIRS

Filed Aug. 20, 1941

Serial No.
407,661

6 Sheets-Sheet 2

FIG. 2

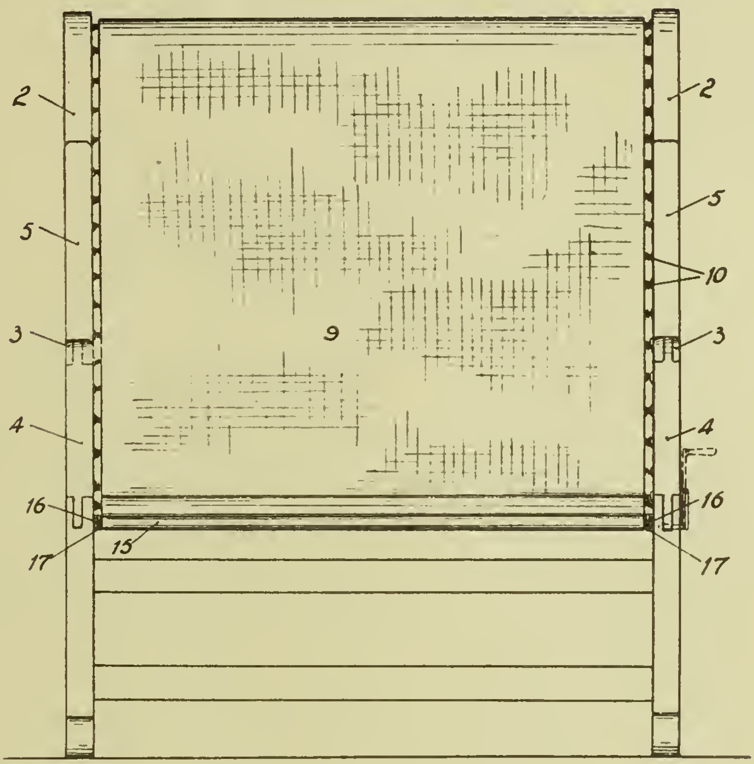


FIG. 16

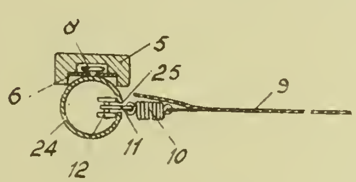
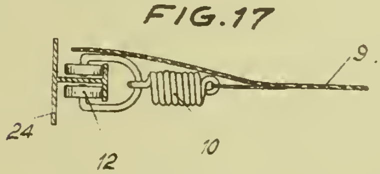


FIG. 17



Inventor

A. M. de Nachtegaal

By

Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. M. DE NACHTEGAAL
BED SETTEES OR CHAIRS
Filed Aug. 20, 1941

Serial No.
407,661
6 Sheets-Sheet 3

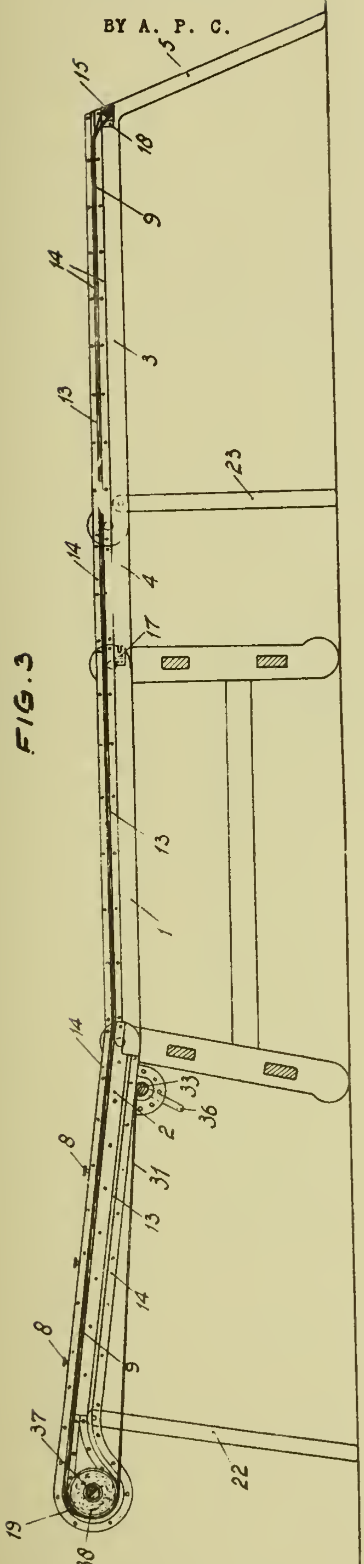


FIG. 3

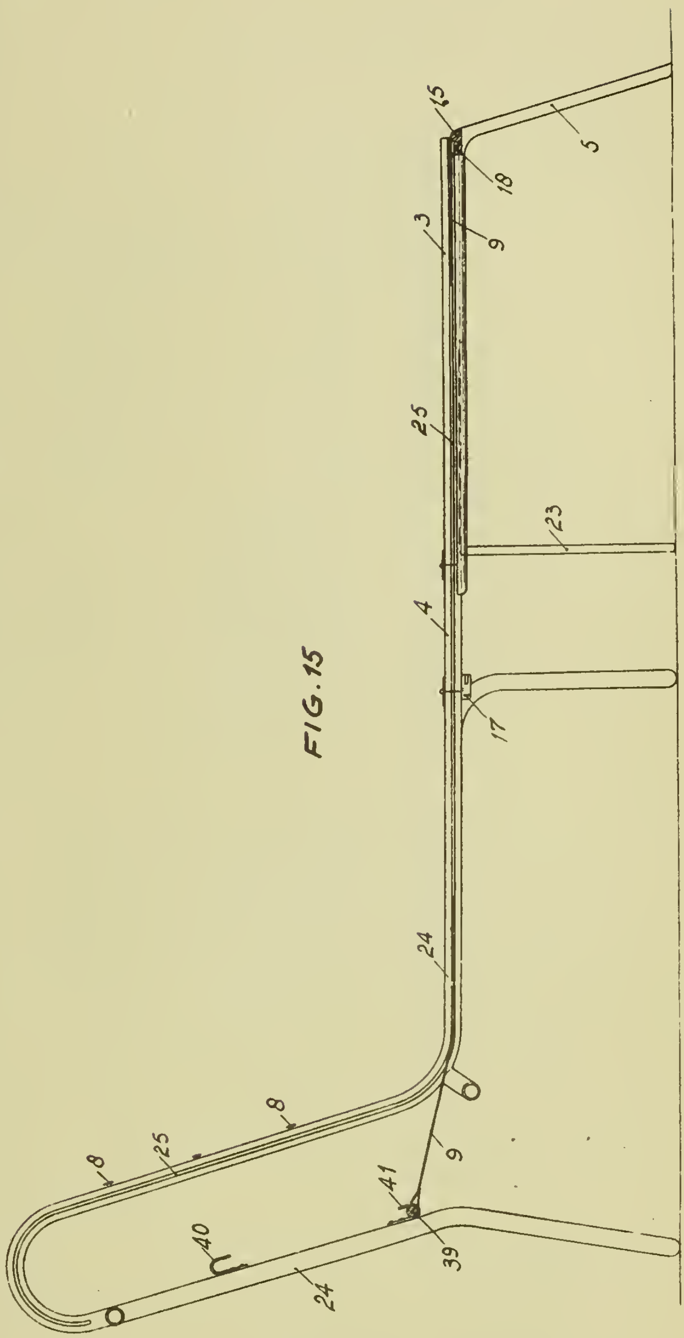


FIG. 15

Inventor
A. M. de Nachtegaal
By
E. F. Wendroth
Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. M. DE NACHTEGAAL
BED SETTEES OR CHAIRS
Filed Aug. 20, 1941

Serial No.
407,661
6 Sheets-Sheet 4

FIG.4

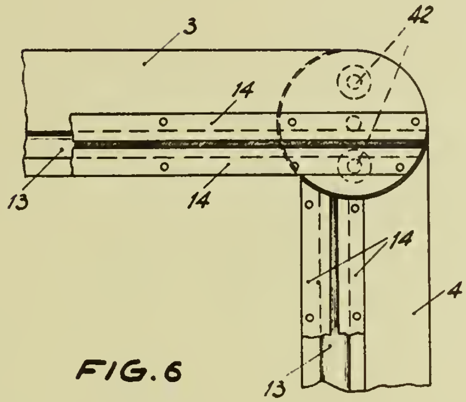


FIG.5

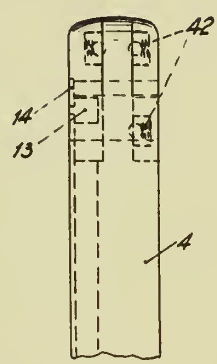


FIG.6

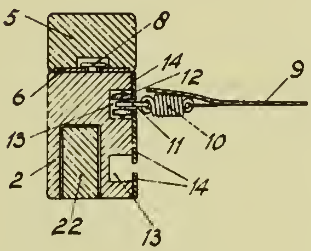


FIG.8

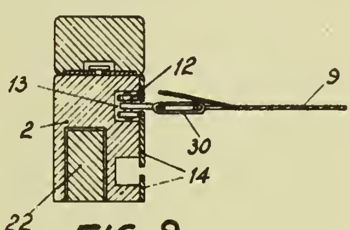


FIG.7

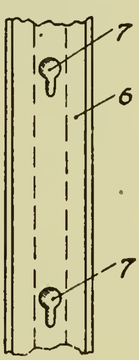
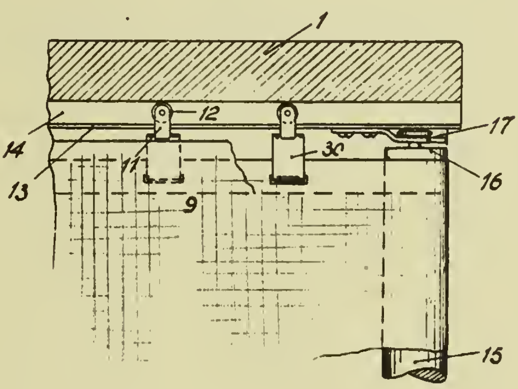


FIG.9



Inventor
A. M. de Nachtegaal,

By

Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. M. DE NACHTEGAAL
BED SETTEES OR CHAIRS
Filed Aug. 20, 1941

Serial No.
407,661
6 Sheets-Sheet 5

FIG. 10

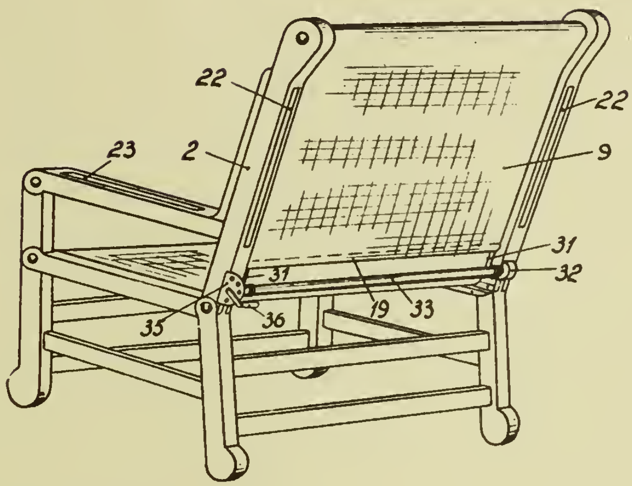


FIG. 11

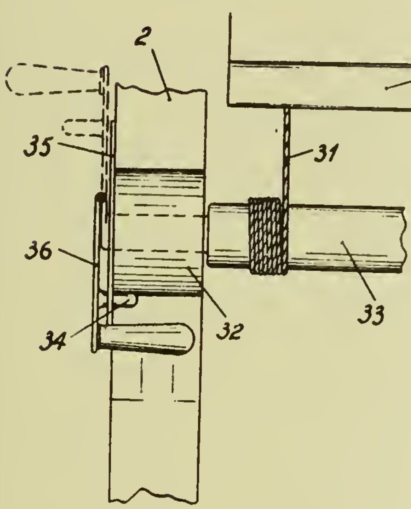
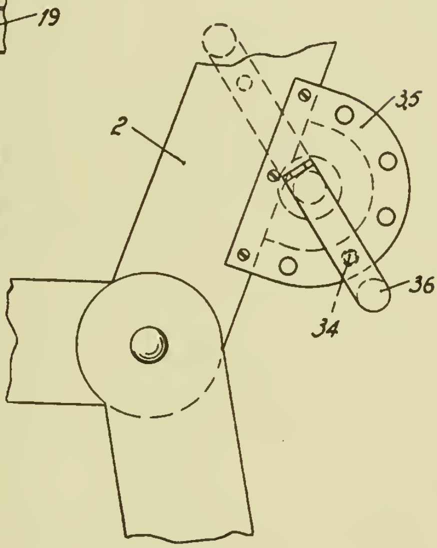


FIG. 12



Inventor
A. M. de Nachtegaal

By
E. F. Wentworth

Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

A. M. DE NACHTEGAAL
BED SETTEES OR CHAIRS
Filed Aug. 20, 1941

Serial No. 407,661
6 Sheets-Sheet 6

FIG. 13

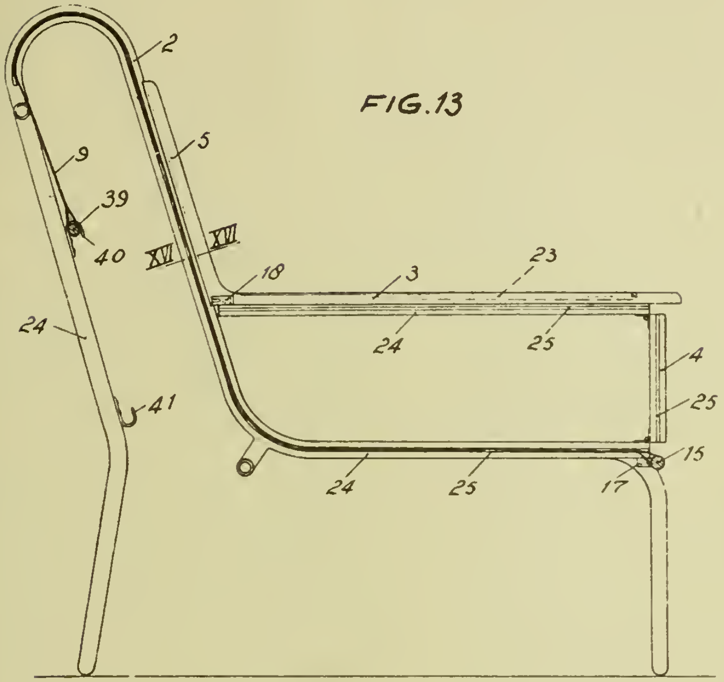
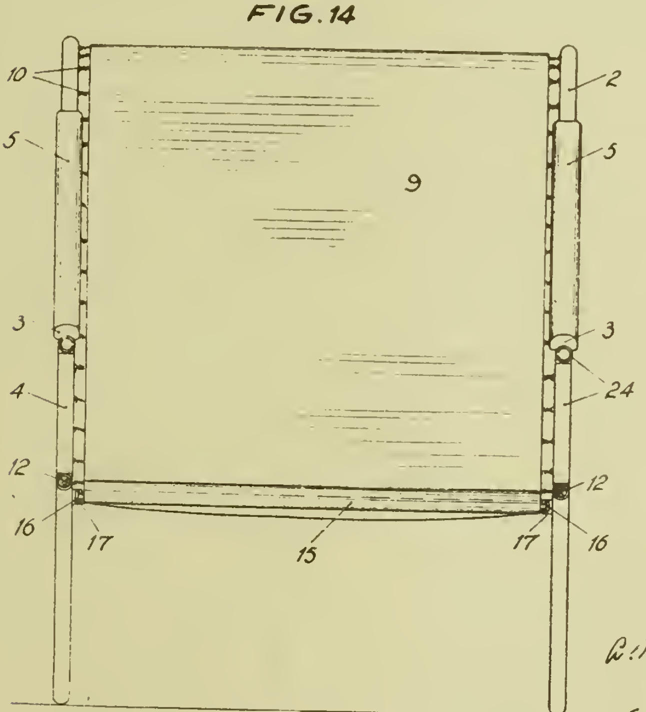


FIG. 14



Inventor
A. M. de Nachtegaal
By
E. F. Wenderoth
Attorney

Published May 11, 1943

Serial No. 407,663

ALIEN PROPERTY CUSTODIAN

BUILDINGS

Paul C. Chelazzi, Shanghai, China; vested in the Alien Property Custodian

Application filed August 20, 1941

The present invention relates to buildings and more particularly pertains to structural features of buildings wherein relatively large unobstructed spaces are provided. The invention more specifically concerns the architectural features of buildings adapted to provide suitable hangars for aeroplanes.

An object of the invention resides in providing a building wherein a plurality of arched beams extend upwardly and outwardly from a common support with the outer ends of the arched beams maintained above the ground or floor of the building by suitable tension means so as to provide relatively large unobstructed spaces under the arched beams.

Another object of the invention includes the provision of a plurality of radially arranged arched beams in a building extending upwardly and outwardly from a supporting member including circumferentially extending tension means connecting the arched beams so as to support the outer ends of the beams above the floor of the building.

A still further object of the invention resides in providing an aeroplane hangar wherein arched beams extend radially from supporting means with the outer ends thereof positioned above the floor of the building to provide relatively large unobstructed spaces thereunder including circumferentially extending tension means connecting the arched beams and maintaining the outer ends of the arched beams above the floor of the building with the tension means supporting the roof.

A further object of the invention resides in providing a plurality of arched beams having circumferentially extending tension means for maintaining the outer ends of the beams in position above the floor of the building wherein the outer thrust of the arched beams is substantially neutralized by the tension means.

Another object of the invention resides in providing a building wherein the structural elements may be prefabricated and readily erected at the building site and dismantled for transportation to a new location for the building.

Other and further objects and features of the invention will be apparent from a consideration of the accompanying drawings and the following description wherein several exemplary embodiments of the invention are disclosed.

In the drawings:

Fig. 1 is a plan view of one type of building embodying the invention with part of the roof removed so as to illustrate the structural features of the building.

Fig. 2 is a sectional view of the building taken on the line II—II of Fig. 1.

Fig. 3 is a plan view of a modified building embodying the features of the invention with the roof removed.

Fig. 4 is a plan view of the supporting means for the arched beams.

Fig. 5 is a partial perspective view of one of the arched beams illustrating the manner in which the forces generated by the structural elements are substantially neutralized.

In carrying out the invention a plurality of arched beams **10** are arranged to extend upwardly and outwardly from a common base member or supporting means **11**. The inner ends **12** of the arched beams **10** may rest on the supporting means **11** or the inner ends of the arched beams may be pivotally connected to the supporting base as illustrated at **13** in Fig. 4.

The arched beams **10** extend in radial directions from the supporting means **11** as shown in Fig. 1. Any number of arched beams may be provided in the building for any plan shape but it is preferable to provide a regular polygonal-shaped building by means of the radial arrangement of the arched beams **10**. In Fig. 1 for example six radially arranged arched beams **10** are provided which extend upwardly and outwardly from the supporting means **11**. The outer ends **14** of the arched beams **10** are maintained above the ground or floor by circumferentially extending tension means. The tension means may consist of cables, chains or ropes **15** having a general ring-shape and suitably connected to the various arched beams **10**. The tension means, however, may be formed of individual cables as shown in Fig. 3. The tension means **15** thus supports the outer ends of the arched beams **10** so as to provide a relatively large unobstructed space under the beams.

The roof of the building is adapted to be supported on the arched beams **10** and on the tension means **15** circumferentially intermediate the arched beams. The roofing of the building is indicated at **16** and may be formed of any suitable roofing material. Thus the roof load is discharged on the tension means or cables **15** which perform the duty of purlins betwen the arched beams. The weight of the roof thus generates a pull at the points **17** where the cables **15** are attached to the arched beams **10**. The forces generated by a particular cable or cables are illustrated in Fig. 5 by the arrows **18**. These

forces provide a resultant force as represented by the arrow 19 which is substantially in alignment with an arched beam 10. Thus the resultant forces 19 substantially neutralize the outward thrust of the arched beams 10.

The outer perimeter of the building formed of the arched beams and tension means as hereinabove described may be suitably anchored so as to prevent tilting of the assembly by means of removable straps 21. These straps may be connected to suitable anchoring means 22 located preferably below the surface of the floor 23. The removable straps 21 may be positioned at any point along the arched beams 10. For this purpose the beams 10 are provided with openings 24 for receiving the upper ends of the straps 21. Thus the straps may be arranged in positions indicated in dotted lines in Fig. 2. The straps 18 may be even removed from some of the arched beams 10 so as to alter the dimensions of the unobstructed spaces under the roof and beams of the building.

The architectural features of the building as provided by the arched beams 10 and the tension means 15 form a building which is particularly suitable for use as an aeroplane hangar. For example aeroplanes may be stored in the building in a manner as indicated in Fig. 1. The downwardly sloping inner ends of the arched beams 10 permit the tail assembly of the aeroplanes to be housed thereunder with a minimum loss of utilizable space in the building.

In carrying out the invention any number of radially arranged arched beams 10 may be included in the building. Thus for example five radially arranged arched beams may be provided as shown in Fig. 3. The five radially arched beams will thus provide a pentagonal-shaped building when the roof is supported on the tension means 15 which connect the arched beams. In Fig. 3 the arched beams 10 extend upwardly and outwardly from a common supporting base 11 in a manner similar to that shown in Figs. 1 and 2. The cables or tension means 15 extending circumferentially of the building may be connected to the arched beams 10 at the points 17 in any suitable manner. Thus for example the ends of the cables may be tied to each beam as shown in Fig. 3.

While the invention has been described with reference to specific structural features the invention is susceptible to various modifications and various types of materials may be employed in the roof, arched beams and tension means.

PAUL C. CHELAZZI.

PUBLISHED

MAY 11, 1943.

BY A P. C.

P. C. CHELAZZI

BUILDINGS

Filed Aug. 20, 1941

Serial No.
407,663

2 Sheets-Sheet 1

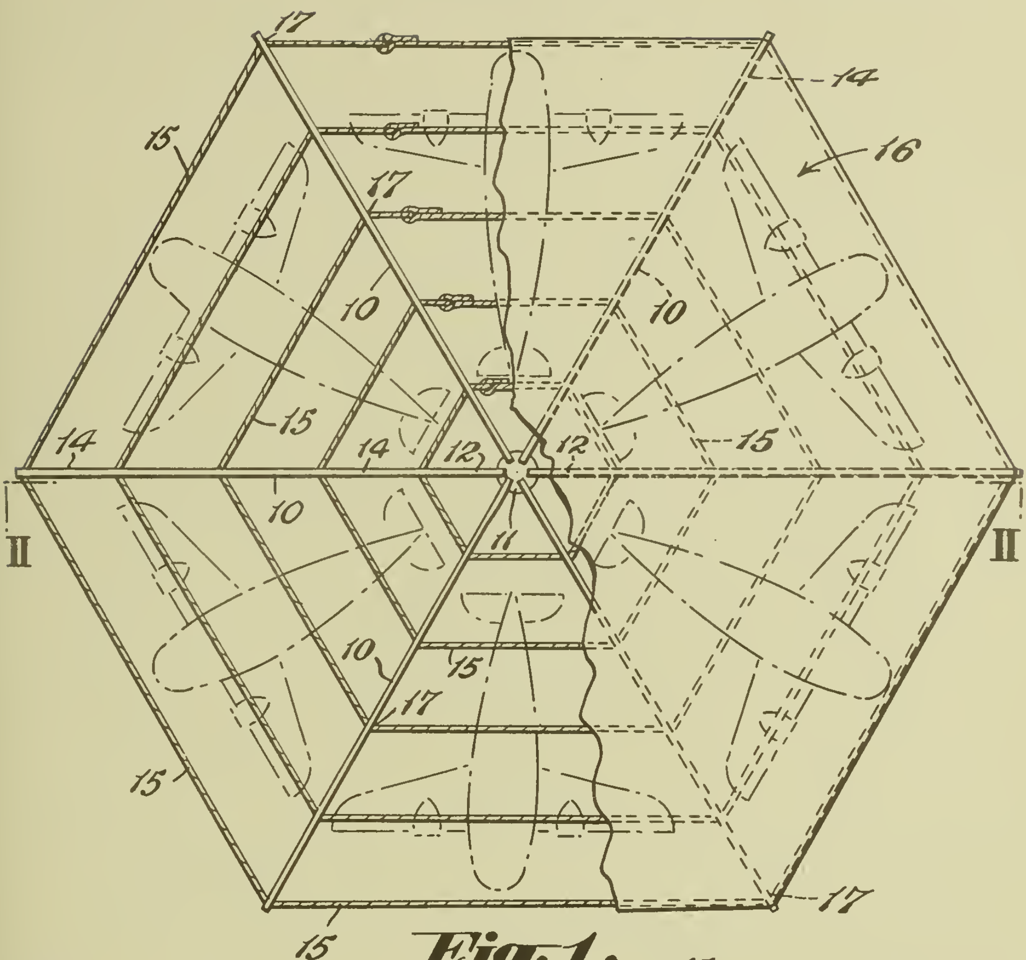


Fig. 1.

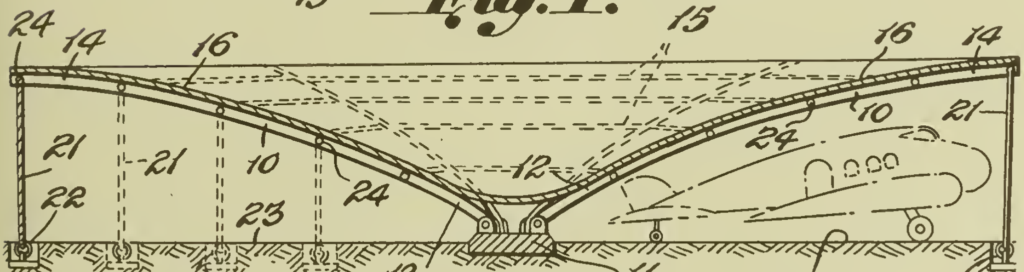


Fig. 2.

Inventor,
Paul C. Chelazzi
By: Glascock Downing & Seebold
Attorneys.

PUBLISHED	P. C. CHELAZZI	Serial No.
MAY 11, 1943.	BUILDINGS	407,663
BY A. P. C.	Filed Aug. 20, 1941	2 Sheets-Sheet 2

Fig. 3.

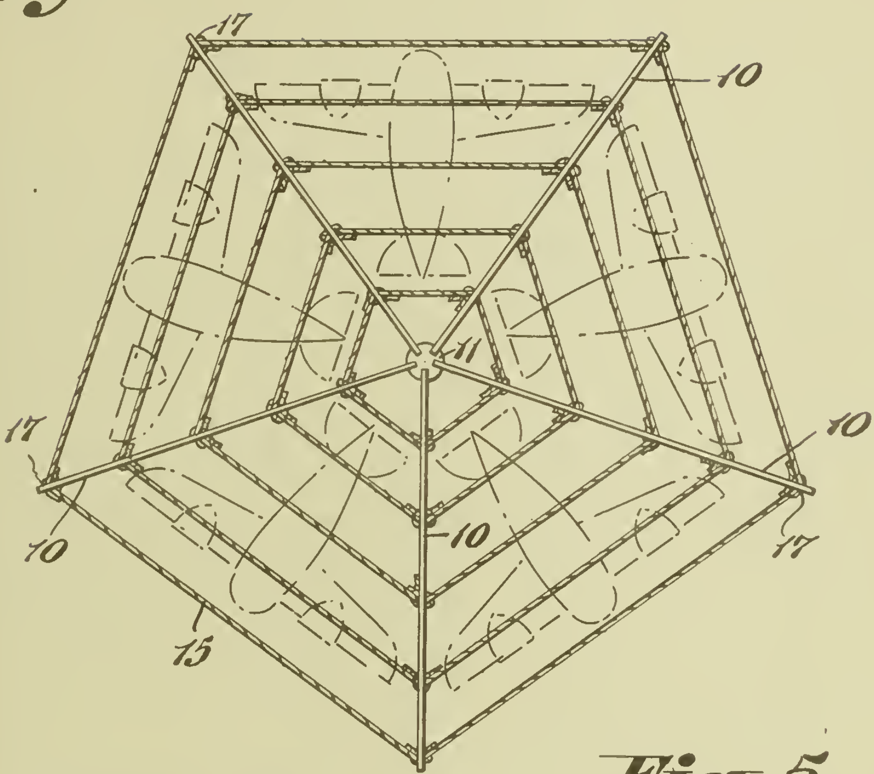


Fig. 4.

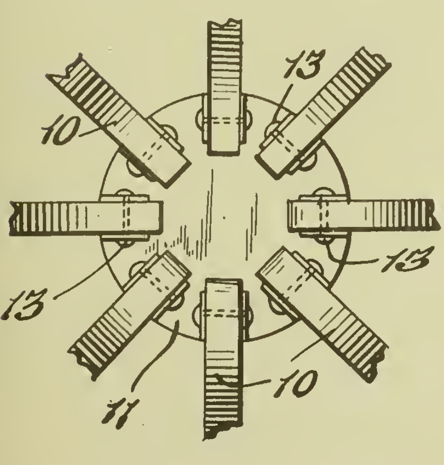
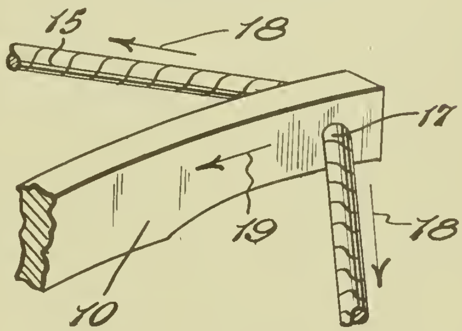


Fig. 5.



Inventor,
Paul C. Chelazzi
By: Glascock Downing & Seebold
Attorneys.

Published May 11, 1943

Serial No. 411,076

ALIEN PROPERTY CUSTODIAN

SPREADING RING LOCK-WASHER

Paul Jacob, Dessau, Germany; vested in the Alien Property Custodian

Application filed September 16, 1941

This invention is directed to a lock-washer. More particularly the invention is directed to a lock-washer which is capable of being repeatedly used without injury.

In place of cotter pins, lock-washers formed as hooked spring rings are frequently used inasmuch as they can be sprung into place and used repeatedly without the permanent deforming such as takes place in an ordinary cotter pin. The conventional spring ring is of circular cross-section, and circular in plan with one end bent radially inwardly or outwardly and lying on the plane of the circle. The circular portion of the ring is seated in an annular groove in a nut, and the free radially extending end passes through an opening in the nut into a hole in the bolt. Such a spring lock-washer can be used repeatedly without damaging distortion. However, it has been discovered that while a lock-washer of this kind is satisfactory for connecting parts which are not subjected to movement or vibration, such a spring lock-washer is not satisfactory for moving or vibrating parts as there is always the danger the washer may spring out of the groove in the nut since because of its small cross-section it has but small holding force. Furthermore when the spring lock-washer is used in a connection which is subjected to torsion stress, the free end of the locking ring which projects through the nut into the bolt is likely to shear off because of its small cross-section. In addition there is always the chance that this free end will pull out of the bolt if the ring has a close good frictional fit in the groove in the nut.

It is the object of the instant invention to produce a lock-washer of novel shape which can be repeatedly used without harmful distortion.

Another object of the invention is to produce a lock-washer which will not spring out of place when the parts are subject to vibration, and which has a higher resistance to shearing stress than the previously known lock-washers.

Generally these objects of the invention are obtained by forming a flat circular split spring ring which has a radially extending flattened portion engageable with recesses in both the bolt and the nut, and other radially extending projections adjacent the split in the ring for the purpose of opening the ring so that it can be placed in a groove in the nut. As the radially extending projection for fitting into aligned grooves in the nut and bolt has its greatest dimension in the direction of the applied torsional stress, it is much stronger than the previously known lock-washers of circular cross-section. If desired this radially extending portion can be made thicker than the remainder of the ring to increase its resistance to shear. Furthermore, because of the flattened spring construction, the ring is resistant to radial distortion and there is little likelihood of the ring being displaced by vibrations.

The means by which these objects of the invention are obtained are more fully described with reference to the attached drawings in which:

Fig. 1 is a plan view of one form of the novel lock-washer applied to a bolt and nut;

Fig. 2 is a cross-sectional view on the line **2—2** of Fig. 1;

Fig. 3 is a plan view similar to Fig. 1 showing a modified form of the washer;

Fig. 4 is a cross-sectional view of the line **4—4**, Fig. 3; and

Fig. 5 is a plan view of still another form of the lock-washer.

In Figs. 1 and 2, the bolt **4** having longitudinally extending slots **6** which are radially directed in the cross-section of the bolt, has a castle nut **8** screwed thereon. At the juncture of the castellations **10***a* with the body of the nut, an annular groove **12** is formed.

As shown, the novel lock-washer **14** is seated in groove **12**. This lock-washer comprises a flat circular piece of spring metal radially split to form two substantially radially extending free ends **16** and **18** projecting outwardly of the circle and having perforations **20** and **22** therein. Diametrically opposite the split is a radially inward extending tongue **24**.

In applying the lock-washer to the nut and bolt, the nut is turned down on the bolt until one of the grooves **10** in the nut becomes aligned with a groove **6** in the bolt. The lock-washer is then opened by a tool such as a pair of pointed pliers, the ends of which are engaged in the perforations **20** and **22**, and placed over the bolt and nut. Tongue **24** is inserted through the aligned openings **6** and **10** and the two halves of the washer are released so that the washer becomes seated in groove **12** in the nut. Because of the flat construction the washer is very resistant to opening forces and is kept tightly seated in groove **12** despite vibration or other moving forces. At the same time tongue **24** provides, by reason of its width, an increased resistance to shear over washers of circular section so that the nut can not turn off the bolt.

A modified form of the invention for use with hollow bolts is shown in Figs. 3 and 4. Nut **30**

may be a conventional castle nut having the usual slots **32** between the castellations. Bolt **34** is hollow and has a groove **36** around the inner periphery thereof. Radially extending slots **38** through the bolt are in the same plane as groove **36**.

The novel lock-washer **40** is composed of a flattened split ring having inward substantially radially directed free ends **42** and **44** provided with perforations **46** and **48**, respectively. The opposite side of the ring has an integrally formed tongue **58** projecting radially outwardly of the ring **40**. In placeing this lock-washer into position the nut **30** is turned down on bolt **34** until a slot **32** in the nut becomes aligned with a slot **38** in the bolt. The ring **40** is then collapsed by means of a special tool, such as a pair of pliers with pointed ends engaging in the perforations **46** and **48**, and inserted into the hollow bolt **34** until the tongue **58** pushes through the aligned slots **32** and **38**. The pliers are then released so that the ring springs into place into groove **36**.

In Fig. 5 a lock-washer is illustrated which has a thickened tongue for the purpose of giving additional resistance to shear stresses. This lock-washer is similar to the lock-washer **14** shown in Figs. 1 and 2 with the exception that the tongue **24*a*** initially has a longer length, as illustrated by the dotted lines, and is bent back upon itself to form a tongue of double thickness. If desired this thickened tongue can be constructed by welding or otherwise securing an additional piece of material to the ring. It is clear that the tongue **58** of the washer shown in Figs. 3 and 4 can likewise be thickened.

In both Figs. 1 and 3 the nut has an uneven number of slots, while the bolt has an even number of slots. Therefore, small turns of the nut on the bolt will bring slots into alignment. Of course, all slots are of equal width and slightly wider than the tongue on the washer.

It is thus apparent that the invention provides a lock-washer which is not permanently deformed by bending when put into place and consequently can be repeatedly used. The lock-washer is easily applied and held in a circumferential groove against longitudinal displacement, the flattened section being greatly resistant to outward springing, while the flattened tongue gives greater resistance to shear stresses than that heretofore obtained by lock-washers of circular section.

PAUL JACOB.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

P. JACOB
SPREADING RING LOCK-WASHER
Filed Sept. 16, 1941

Serial No.
411,076

Fig 1

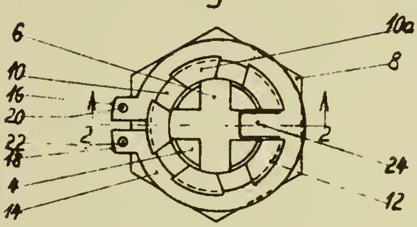


Fig 2

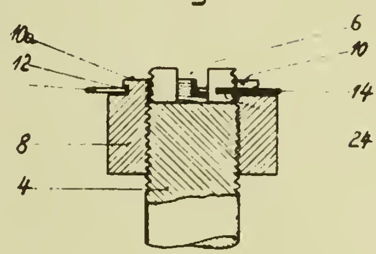


Fig 3

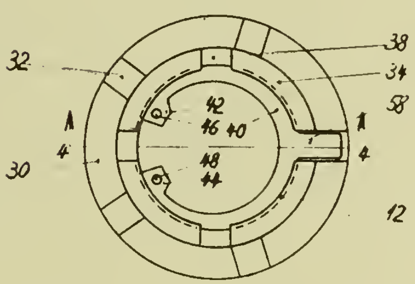


Fig 4

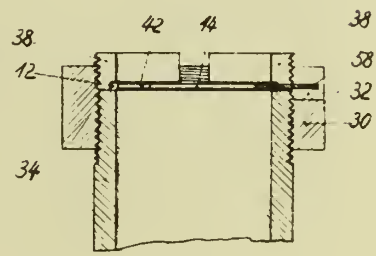
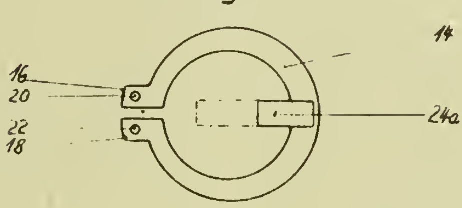


Fig 5



INVENTOR.
Paul Jacob,
BY
Bailey, Stephens & Huettig
Att'ys

Published May 11, 1943 Serial No. 412,524

ALIEN PROPERTY CUSTODIAN

REGENERATING DEVICES FOR THE LUBRICATING OIL FOR MOTORS AND THE LIKE

Jean André Lautrette, Paris, France; vested in the Alien Property Custodian

Application filed September 26, 1941

This invention relates to a device for continuously regenerating lubricating oil for motors and like applications.

It has already been proposed to regenerate and purify the lubricating oils which have been used for the lubrication of motors and more particularly of internal combustion engines by submitting said oils to a convenient treatment in a stationary plant. This process require a periodical "emptying" or discharge of the wasted oil of the motor and the filling up with new oil so that for a given motor the lubricating oil has its maximum of efficiency at the time of its introduction in the motor while arriving to a minimum at the time of emptying of the motor.

The device according to this invention which remedies above drawbacks comprises in combination with a motor and the lubricating plant of same a regenerating device of the oil arranged either in series or preferably in derivation on the circuit of lubricating oil, and comprising a distillation plant which eliminates the gas oil, the benzin as well as the soluble impurities contained in said oil with an atomizing or pulverising device actuated by the exhaust gases of the motor conveniently purified and brought to a nearly constant pressure, a convenient filter being located in the outlet of the regenerator with a view to secure the oil to be constantly maintained in a convenient state of purity and considerably reducing and even suppressing the necessity of "emptying" the motor.

According to a preferred embodiment of the invention, the device when applied to a motor such as for instance an internal combustion engine for motor car or other applications comprises inside a common casing a convenient filtering cartridge located between the oil inlet and a distillating device provided on the one hand with a device for the adduction of hot exhaust gases and with a communication with the admission of the motor, an emptying arrangement being provided for the regenerated oil, thus securing not only the constant regeneration of the lubricating oil of the motor but also the recovering of the fuel which may have been mixed with lubricating oil, and the sending back of said fuel to the admission of the motor.

In the accompanying drawings which show constructional forms of the device according to this invention:

Fig. 1 is a diagrammatic view showing the circuit of lubrication of the motor and the regenerator.

Figs. 2 and 3 are two vertical sections made along plans at right angles of a first constructional form of the device.

Fig. 4 is a modification of Fig. 3.

Figs. 5 to 11 show other constructional forms of the device.

Fig. 12 is an external view of another constructional form of the device.

Fig. 13 is an axial vertical section on a larger scale.

Fig. 14 is a section of the filtering device.

Figs. 15, 16, 17 show in perspective the element of filtering device which are constituted by a filtering cartridge, by a rolled membrane and by a foraminated tube.

Fig. 18 shows a distillating device.

Fig. 19 shows on a larger scale the obturator of the distillating member forming at the same time, an assembling device.

Figs. 20, 21 and 22 show details of the distillating device.

The lubrication circuit of a motor for instance of an internal combustion engine 1 (Fig. 1) generally speaking comprises an oil tank 2 constituted by the carter of the motor and a lubricating pump 3 which draws oil from said carter and forces same into the motor 1 preferably through a filter 4.

According to this invention, I arrange in said circuit in derivation a regenerator 5 which is derived on said lubricating circuit by an inlet pipe 6 and an outlet pipe 7 connected with the lubricating circuit preferably after the lubricating pump 3.

The regenerator comprises a tank 8 (Figs. 2 and 3) containing in its central part a distillating column 9 followed by a collecting tank 10 having a filter 11.

The tank 8 contains in the space comprised between external wall and the wall of column 9 a filtering purifying packing and said tank is provided with a feeding in tubulure 12 which brings exhaust gases coming from the exhaust pipe of the motor. A pipe 13 connects the lower part of tank 8 with a pulverizer 14 which opens inside column 9. A tubulure 15 feeds the pulverizer 14 with the oil coming from the lubricating circuit and brought for instance by a pipe such as 6 (Fig. 1).

The column 9 comprises on its upper part a plate 16 on which are piled up cooling bodies such as for instance as balls and in its lower part a receptacle 17 containing a convenient substance such as for instance activated earth in-

side which arrives a derivation 19 (Fig. 3) coming from the pulverizer 14.

A tubulure 20 with a non-return valve connects the column 9 with the pipe 10. The exhaust gases are heated in the tubulure 12 to the convenient temperature and they are filtered and maintained at a constant pressure eventually by means of a regulating valve. Said gases are filtered and the oxygen which they are still containing is kept by the filtering substances of the tank 8. The hot exhaust gases which are thus constituted for the greater part if not wholly of inert gases such as nitrogen and carbon dioxide are sent by pipes 13 into the pulverizer 14 in which arrives also under pressure the oil forced by the pump 2 and the pipe 6. Said oil is pulverized and brought to the desired temperature without having the time to be cracked. It arrives into the column 9 in which owing to its extreme division and to the thermic and mechanic action, it is deprived from the gas oil or benzin which it contains as well as of the soluble impurities which are distilled in said conditions. The exhaust gas which escapes through the pulverizer 14 into the column 9 escapes from the latter by crossing the plate 16 and the cooling bodies for being sent to the open air through the tubulure 21.

The oil deprived from gas oil falls down upon the powdered activated earth 18 which is kept in a convenient divided state by being agitated by means of the exhaust gases coming from the derivation 19 and the pressure existing in the column forces the oil mixed with earth through the tubulure 20 into the pipe 10 in which said oil is submitted to an ultra filtration on the filter 11. The purified oil may also be sent back to the lubricating circuit through the tubulure 22 and pipe 7.

A non-return valve is preferably arranged in the tubulure 20 for avoiding any coming back of oil in the column at the time of stopping of the motor.

The agitation of the earth 18 could as shown in Fig. 4, be effected by means of a screw propeller 23 actuated by a mill 24 which receives the jet of oil coming from pulverizer 14.

The previous filtration of the exhaust gases may be dispensed with by using for instance the constructional form of Fig. 5 which directly receives the gases in a determined place of the exhaust pipe. The oil which has been deprived from gas oil in the column 25 arrives into a compartment 26 from which under the pressure it falls down into the compartment 27 containing the activated earth; said oil mixed with earth leaves said compartment through pipe 28 which sends same to the filtering pipe 29. In that arrangement, the heating may be effected by hot air brought by a heating pipe connected with the exhaust pipe.

Non return valves prevent any coming back of oil.

In the constructional form of Fig. 6 which shows an arrangement similar to that of Figs. 2 and 3 for the distillation of oil and the filtration of exhaust gases, the column being however divided into two parts 30, the filtration is effected by means of elements 31 constituted for instance by conveniently solidified activated earth and which however may be substituted, as seen in Fig. 7, by a cartridge 32. Of course, the distillation column may receive a division still more important than that of Figs. 6 and 7.

In the modification of Figs. 8 and 9 the oil to be regenerated may be forced to the apparatus by a pump 33 which could either as in Fig. 8, be located at the lower part of the column 34 in which arrives the injector 35 of the exhaust gases, or as in Fig. 9, be arranged in the compartment 36 located on the lower part of the apparatus for the oil which has been collected. Said pump could be actuated by an electric motor or by any other means.

In the constructional form of Fig. 9, the bottom 37 could be made swivelling as shown in Fig. 10.

In the constructional form of Fig. 11 the oil is not pulverised by the exhaust gases but said hot oil is brought from the carter under pressure through the pipe 38 for instance to a foraminated crown 39 located in the distillation column 40, the purified and conveniently heated exhaust gases arriving at a convenient pressure from the chamber 42 enter the column 40 through a crown 41, the arrangement being, for the other parts, similar with any other preceding constructional form.

In the constructional form of Figs. 12 to 22, the regenerating apparatus comprises an external casing 43 made for instance of thin sheet iron resting through its lower end upon a plate 44 with interposition of a tightening packing 45 upon which it is applied by a nut 46 which tightens the casing 43 through a tightening packing 47. The plate 44 and the nut 46 are screwed on the ends of an internal tube 48 which constitute a distillator. A tubulure 49 bringing the oil to be purified crosses the lateral wall of the casing 43 and communicates with an annular chamber 50 provided between the internal face of the casing 43 and a filtering cartridge 51 located between the ends of the casing 43 with interposition of tightening packings 52—53.

The filtering cartridge 51 constituted by a convenient substance such as for instance a mass of fuller's earth or any convenient filtering substance such as a cloth either rolled or piled up with or without the impregnation of a convenient solution receives an internal lining constituted by a membrane 54 conveniently rolled and constituted by any convenient substance such as cloth or the like applied against the wall of the internal chamber of the cartridge 51 by means of a foraminated tube 55 for instance of metal. Said tube is centered on a projection 56 of plate 44 thus keeping the filtering cartridge 51 conveniently centered inside the casing 43.

The several parts of the filtering cartridge are preferably kept together by means of plates 57—58 (Fig. 14) which may be connected together in any convenient manner or which may also be screwed in the internal tube 55.

The destillating pipe 48 which leaves between itself and the foraminated pipe 55 of the filtering device an annular chamber 59 and which is screwed by its lower end into the plate 44 receives on its upper screw threaded end the connecting nut 46 with interposition of a tightening packing 60 (Fig. 19) compressed by a spring 61 in order to secure the tightening of said screw 46 at the same time on the tube 48 and on the external casing 43. Said tube which in some way constitutes a distillation column is provided in a convenient place of its height a foraminated cone 63 in which are piled up contacting members such as for instance spheres 64 in any convenient number which may be constituted for instance by glass pearls. Under said cone 63 are provided in the wall of tube 48 small orifices 65

the desired dimension of which is obtained by providing in the tube foraminations cylindrical or conical in shape and provided with polygonal obturator **66**. (Figs. 21 and 22) thus obtaining in the wall of tube **48** orifices in the shape of splits having a very small dimension.

The plate **44** comprises a tubulure **67** connected with a derivation of the exhaust gases of the motor and comprises a non return valve having the shape of a ball **68**. An outlet tubulure **69** is provided in the same plate for the exhaust of purified oil while the upper stopper **46** is provided with a tubulure **70** for the escape of the volatile components said tubulure being connected by means of a pipe not shown in the drawing with the admission side of the motor not shown in the drawing.

The operation is as follows:

The apparatus being located for instance in derivation in the circuit of lubricating oil of the motor and coming from the carter arrives to the tubulure **49** passes the filtering cartridge **51** and the membrane **54** for arriving into the annular chamber **59** and from there passes through orifices **65** inside the distillating tube **48**. Such passage of oil takes place under pressure so that the oil enters tube **48** either under a pulverized form or under the shape of thin jets. Said oil flows along the walls of said tube and it is swept by the exhaust gases of the motor which arrive through the tubulure **67**. Said oil thus simultaneously supports a mechanical shock owing to its passage through the thin orifices **65** and an increase of temperature owing to its contact with the exhaust gases. Said exhaust gases escape at the upper part of tube **48** through tubulure **70** and carry with them the light components (benzin, gas oil, etc. . . .) contained in the oil coming from the carter. The light particles of oil which are also taken with the exhaust gases are condensed in contact with pearls **64** and fall down to the lower part of tube **48** which constitutes a distillation column. The exhaust gases loaded with benzin vapours or gas oil and passing through the tubulure **70** are sent to the admission of the motor while the purified oil which is collected in the bottom of tube **48** constituting distillation column is sent back to the lubricating circuit through tubulure **69**.

When the motor is working the exhaust gases arrive into the column while raising the ball **68** which constitutes non return valve but when the motor is idle the pressure of exhaust gases being nul, said gases cannot arrive into the column **48** and at that time, the distillation of oil is effected under the vacuum created in the column **48** by the suction of the motor.

The described arrangement allows an easy quick dismounting of the apparatus each of the parts being practically instantaneously accessible, and said parts being in a position of being quickly replaced.

The device described hereabove were given only as examples and it is obvious that their shape and volume may vary according to the needs in every particularly instance. They may be adapted for apparatus not located on motors but which would be used for instance in stationary places for the regeneration of wasted lubricating oils of motors. The gas used for the pulverization of oil could be the exhaust gas of a motor or any other gas preferably inert relatively to the oil such as for instance nitrogen with a convenient temperature and pressure.

The invention applies for the regeneration and purification of lubricating oils for motors of any type and more particularly for internal combustion motors and the like.

JEAN ANDRÉ LAUTRETTE.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. A. LAUTRETTE

REGENERATING DEVICES FOR THE LUBRICATING OIL FOR MOTORS AND THE LIKE

Filed Sept. 26, 1941

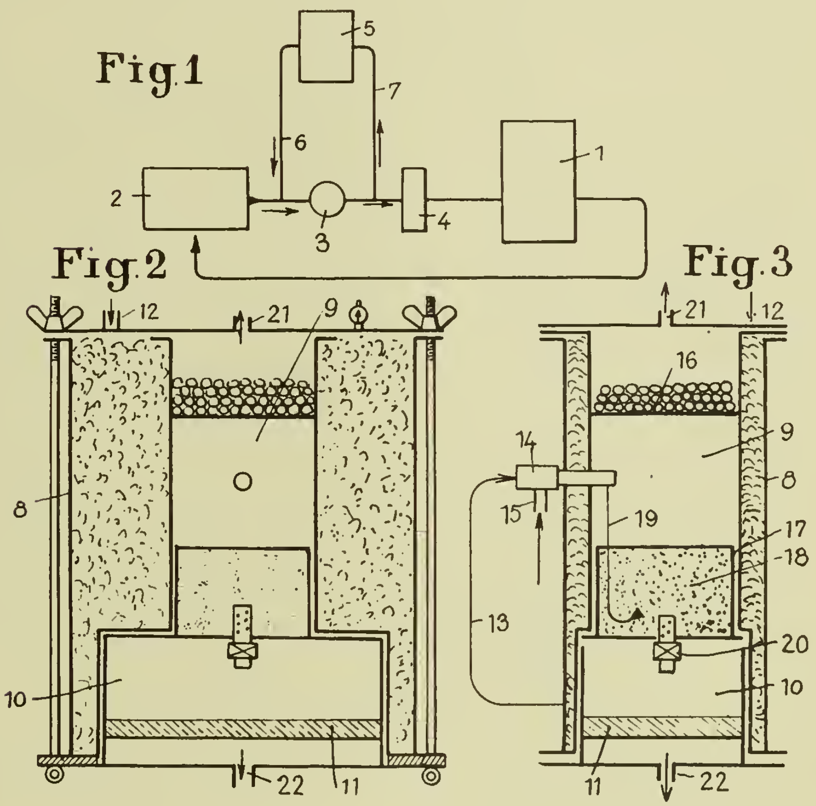
Serial No. 412,524

6 Sheets-Sheet 1

Fig.1

Fig.2

Fig.3



Inventor,
J. A. Lautrette

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. A. LAUTRETTE

REGENERATING DEVICES FOR THE LUBRICATING OIL FOR MOTORS AND THE LIKE

Filed Sept. 26, 1941

Serial No. 412,524

6 Sheets-Sheet 2

Fig. 5

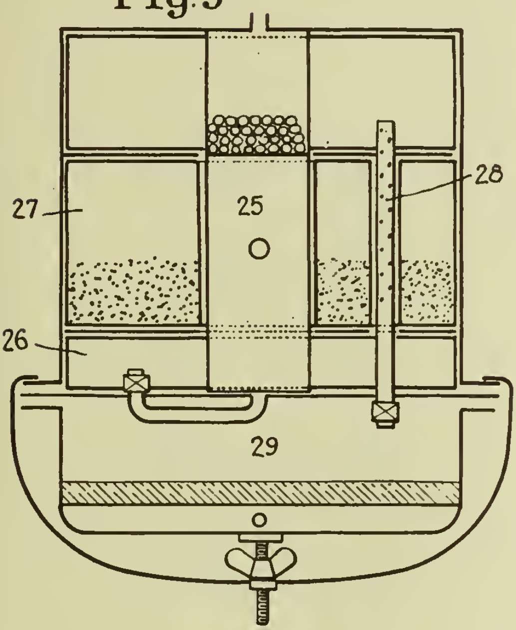


Fig. 4

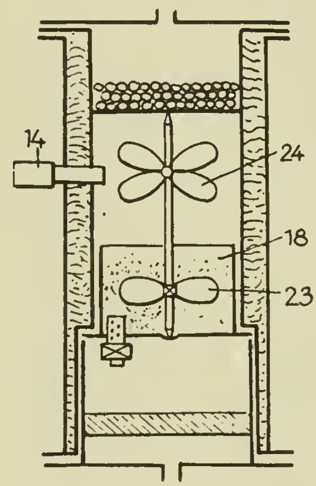


Fig. 6

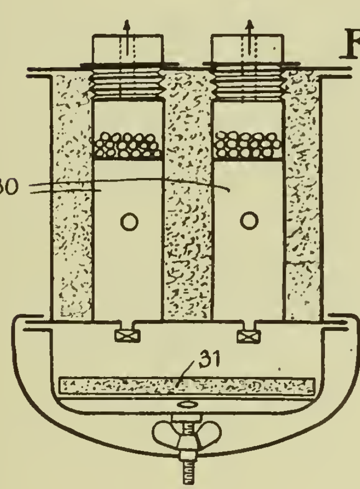
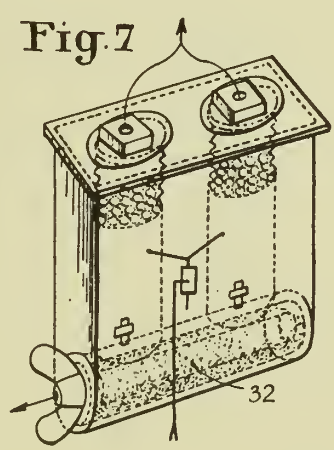


Fig. 7



Inventor

J. A. Lautrette

By: Glascock Downing & Seebold

Attys

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. A. LAUTRETTE

REGENERATING DEVICES FOR THE LUBRICATING OIL FOR MOTORS AND THE LIKE

Filed Sept. 26, 1941

Serial No. 412,524

6 Sheets-Sheet 3

Fig. 8

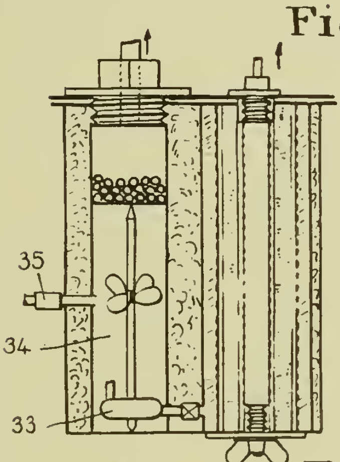


Fig. 9

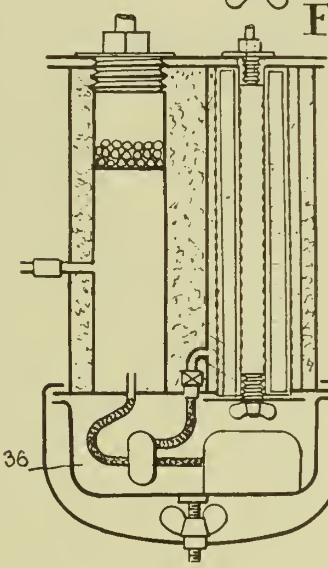


Fig. 11

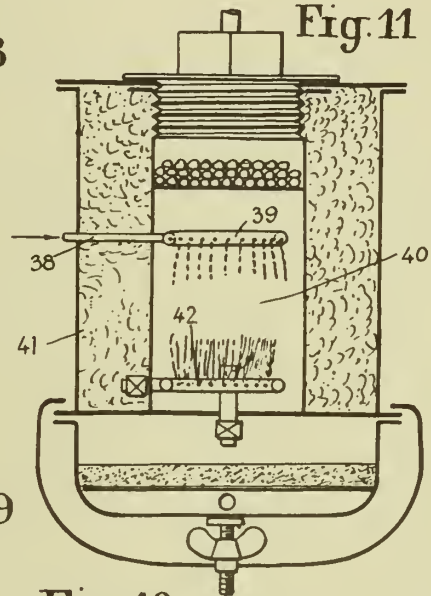
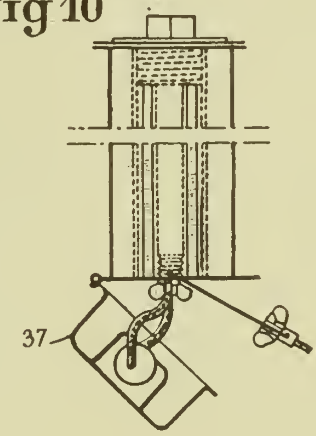


Fig. 10



PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. A. LAUTRETTE
REGENERATING DEVICES FOR THE LUBRICATING
OIL FOR MOTORS AND THE LIKE
Filed Sept. 26, 1941

Serial No.
412,524

6 Sheets-Sheet 4

Fig. 12

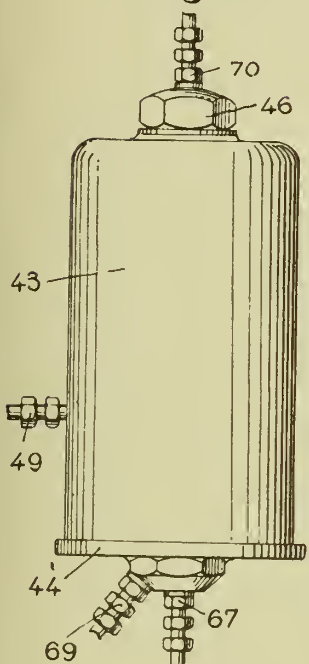


Fig. 14

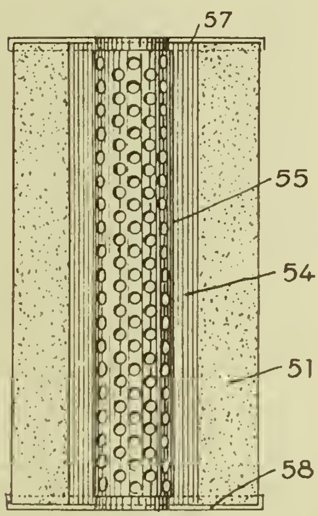


Fig. 15

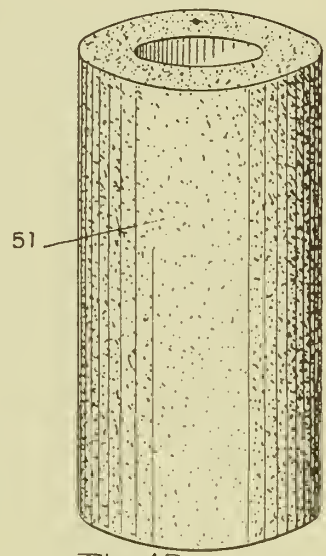


Fig. 16

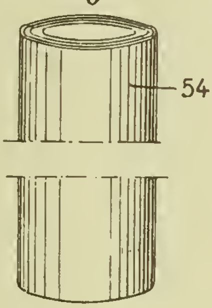


Fig. 17

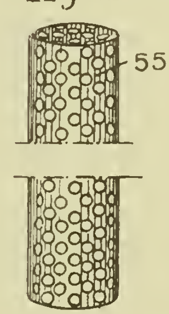
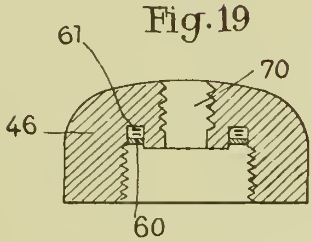


Fig. 19



Inventor,
J. A. Lautrette

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. A. LAUTRETTE

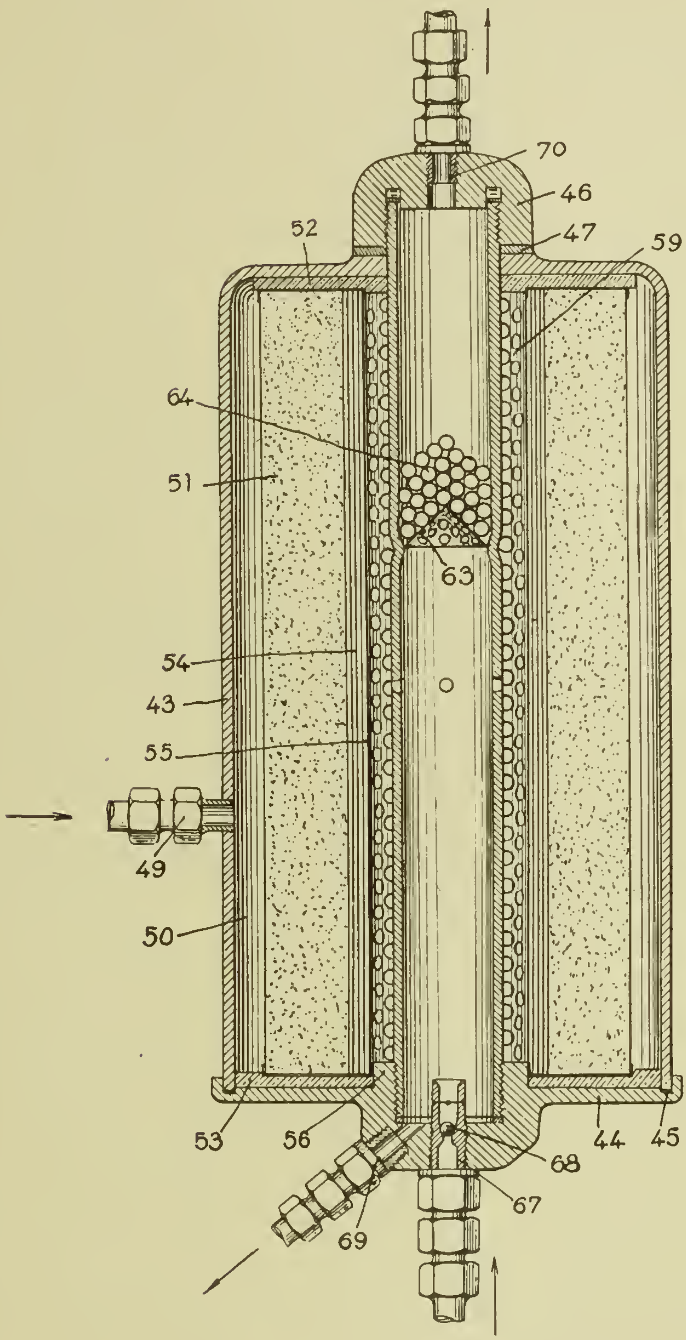
REGENERATING DEVICES FOR THE LUBRICATING OIL FOR MOTORS AND THE LIKE

Filed Sept. 26, 1941

Serial No. 412,524

6 Sheets-Sheet 5

Fig. 13



Inventor,
J. A. Lautrette

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. A. LAUTRETTE
REGENERATING DEVICES FOR THE LUBRICATING
OIL FOR MOTORS AND THE LIKE
Filed Sept. 26, 1941

Serial No.
412,524

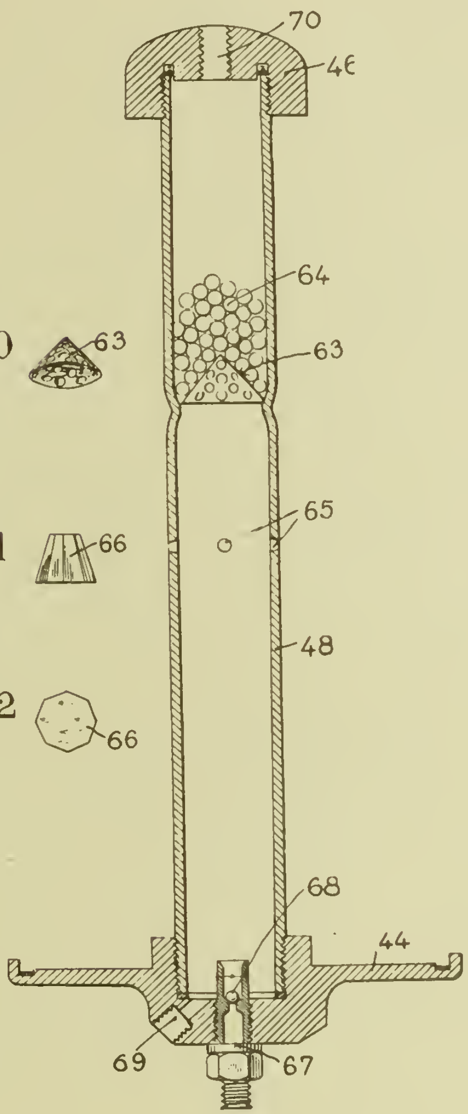
6 Sheets-Sheet 6

Fig. 18

Fig. 20

Fig. 21

Fig. 22



Inventor,
J. A. Lautrette

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943

Serial No. 414,866

ALIEN PROPERTY CUSTODIAN

METHODS ELIMINATING THE COLORATION OF GLASS OBTAINED BY ELECTRIC MELTING

Bernard Long, Paris, France; vested in the Alien Property Custodian

No Drawing. Application filed October 13, 1941

The melting of vitrifiable materials by the passage of an electric current in a bath of glass acting as resistor presents, among other inconveniences, that of imparting to the glass a yellow or greenish-yellow coloration which it has been attempted to attenuate by various means.

For that purpose, for instance oxidizing compounds, such as nitrates, capable of modifying the dyestuffs dissolved in the glass, have been mixed with the molten vitrifiable materials or glass. It has also been attempted to renew, by stirring, the contact surface of the molten glass with an oxidizing atmosphere. Finally, according to the nature of the electrodes, the quantity of energy dispersed per unit of volume in the immediate vicinity of said electrodes has been adjusted so as to reduce to the minimum the coloration of the glass for each mixture of vitrifiable materials.

Experience has shown that these various means are insufficient for overcoming the dyeing action of certain reducing bodies which remain in suspension in the glass, such as the particles of electrodes which are pulled off and dispersed by the passage of the current in the molten glass, and the compounds which are produced by the action of said particles on the sulphuretted vitrifiable materials, for instance on alkaline metal and alkaline-earth metal sulphates.

The invention consists in incorporating with the glass substances capable of dissolving the reducing bodies, such as sulphides, which are in suspension in the glass. Among these solvents zinc oxide and cadmium oxide are particularly efficient.

The substances thus incorporated are added, preferably, to the vitrifiable materials which are rendered oxidizing by addition of nitrates, arsenious anhydride, or antimony oxide for instance.

The proportion of solvents employed varies, of course, according to the quantity of reducing bodies in suspension in the glass. In particular for sodo-calcic glasses of ordinary composition a proportion of zinc oxide smaller than 5% is sufficient.

The following vitrifiable mixtures are given by way of examples:

Example I

Sand	100
Carbonate of soda	29.4
Sulphate of soda	2
Nitrate of soda	3
Limestone	26.8
Zinc oxide	2.7
Arsenious anhydride	0.5

Example II

Sand	100
Feldspath	11.8
Carbonate of soda	33.3
Sulphate of soda	1
Nitrate of soda	4
Limestone	21
Dolomite	6.8
Zinc oxide	4.5
Arsenious anhydride	0.5

Example III

Sand	100
Borax	3.8
Hydrated alumina	1.1
Carbonate of soda	36.7
Nitrate of soda	2
Limestone	20.3
Zinc oxide	6.4
Antimony oxide	0.7

Glass produced by the first mixture contains approximately 2% of ZnO, by the second mixture 3% of ZnO and by the third mixture 4.5% of ZnO.

BERNARD LONG.

Published May 11, 1943 Serial No. 414,965

ALIEN PROPERTY CUSTODIAN

CARD INDEX SYSTEM

Otto Lampertz, Berlin S. W. 29, Germany; vested in the Alien Property Custodian

Application filed October 14, 1941

This invention relates to certain improvements in card index or register systems of the type in which the cards or pockets are arranged on a support or carrier.

It is already known to secure index cards or pockets to a carrier member, by suitable supporting means. To this end, members having several legs have been arranged on the carrier in such a manner that their closed ends face the carrier, while the legs serve for fixing the sheets. The legs are either glued to the sheets or provided to engage the sheets clip-fashion by means of toothed portions. This construction has the disadvantage, however, that it is very difficult to exchange any sheets independently of their supporting means. This known system, therefore, is not suitable for the provision of any desired number of interchangeable, additional sheets. By the provision of additional multiple sheets either the sight-space would be interfered with or the handling of the single index cards and the utilization of the pockets, if any, is rendered difficult.

It is an important object of the present invention to provide means, in card index systems of the type referred to, permitting the attachment of a greater number of sheets and the ready insertion and removal of the sheets attached to one support, without impairing the coherence of the card index.

With this and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawings, but includes further structures coming within the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its structural forms, as illustrated by the accompanying drawings in which:

Fig. 1 is an elevation, partly in section, of a carrier member having the invention applied thereto, including a pocket or case and a multiple sheet arranged thereon, this sheet being shown as partly cut out.

Fig. 2 is a view similar to Fig. 1, but showing a modified form,

Figs. 3 to 8 are views of further modifications.

Similar character of reference denote similar parts in the different views.

Broadly speaking, and as here shown, the carrier member according to the present invention is provided with eyelet members and bar members adapted to be passed through said eyelet members and to secure the detachable, folded multiple sheets in position, by engaging under the inner face of the fold.

Either the eyelet members or the bar members engage through suitable slots provided in the folds of the folded sheets. In this manner the folded sheets are reliably secured to their carriers or supports and are prevented against unintentional separation therefrom, even when subjected to rough handling in use.

Referring now to the drawings in greater detail, and first to Fig. 1, a pocket or case 2 for the reception of cards is provided on a flexible strip-shaped carrier member or support 1 which has also secured to it an eyelet member constituted by a sling or loop 3 which is preferably made of a tough, flexible material, such as, linen, to permit swinging of the sling 3 with respect to the carrier 1. The sling 3 serves for attaching one or more multiple sheets 4 consisting of folded larger sheets and to this end is passed through a suitable slot in the folded edge of this multiple sheet 4 which is prevented from sliding down from sling 3 by means of a bar member 5 passed through the sling. The bar member 5 may consist of a transparent material in order that the free sight may not be affected by it and it is made of such a width as to be safely held in its eyelet by frictional engagement.

The embodiment shown in Fig. 2 differs from that of Fig. 1 in that two slings 6 are provided instead of one sling 3 of Fig. 1, these two slings being passed through corresponding slots provided in the folded edge of the multiple sheets 4. The two slings may be secured by a common bar member 7, as shown in Fig. 2, or by two separate bar members after the manner shown in Fig. 1.

Where it is intended to hold the multiple sheets tightly together also after they have been removed from the carrier, the construction shown in Fig. 3 may be used. The bar member 8 in this case is formed with cranked end portions 9 and 10 passed through suitable slots of the multiple sheets 4 and projecting into the loops 6. Of course, it must be sufficiently flexible to permit its introduction into and removal from the loops by bending it. If desired, two separate cranked members may be provided for suspending the sheet.

Referring now to the embodiment shown in Fig. 4, this modification is distinguished from that of Fig. 2 by a different construction of the eyelet members 11. The slings 6 of Fig. 2 are made by folding a strip of material and connecting its free ends together, as by stitching. The

eyelet members 11 of Fig. 4 on the contrary consist of a plain one-layer strip having a slot or eyelet 12 through which the bar 7 may be passed. In this manner the manufacturing cost for the pockets may be further reduced.

According to a further feature of the invention, the bar members may be constructed as shown in Fig. 5, illustrating a loop whose upper portion 13 is formed with obliquely cut side edges slightly converging towards the top, while the lower portion of the loop is formed with parallel side edges, thereby forming guide faces 14 for the bar member to be passed through the loop. This facilitates the introduction of the bar member or members and makes for speed in operation.

It is not necessary for the eyelet members to be made of a special or separate piece of material, but where a pocket for cards is provided at the carrier the eyelet members may be made from the material of the pockets proper, as indicated in Fig. 6. In this case tongues 15 and 16 are cut out of the pocket 2, the free ends of these tongues being bent towards the carrier strip 1 and secured thereto. In this manner the slings may be formed without wasting any material nor using any additional material.

Referring now to the modification shown in Fig. 7, the slings 17 in this case are also made from the same material as the pocket for the cards. To this end the tongues constituting the eyelets are formed as extensions of the rear edge of the pocket. The strip thus produced is at first bent towards the visible edge of the pocket and then folded over towards the carrier 1 to form a sling, as shown, its free end being secured to the carrier, as by glueing or stapling. Thus two eyelets 17 are formed for reception of the bars.

In the embodiments shown in Fig. 8 in a fragmentary view, a double-U-shaped wire member 19 has been provided on carrier 18, an eyelet member 21 being arranged to ride on the lower leg 20 of member 19. Member 21 may consist of a strip of sheet metal or any other suitable material which as shown is folded together, its upper free ends being connected together by stapling. Member 19 may be secured to strip 18 by sandwiching it between two strips 18 which are then connected together as by glueing and/or staples. It is not necessary for the supports to carry always a pocket for cards, but the eyelet members may also be secured to carriers carrying no pockets.

The connections or joints between the carrier members and the index cards or pockets and between the carrier members and the eyelet members may be produced by glueing and/or by stapling, as indicated at 22.

The index cards or pockets shown in the figures are of course suspended in suitable holders, by means of the projecting portions of their carrier strips 1.

The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

OTTO LAMPERTZ.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

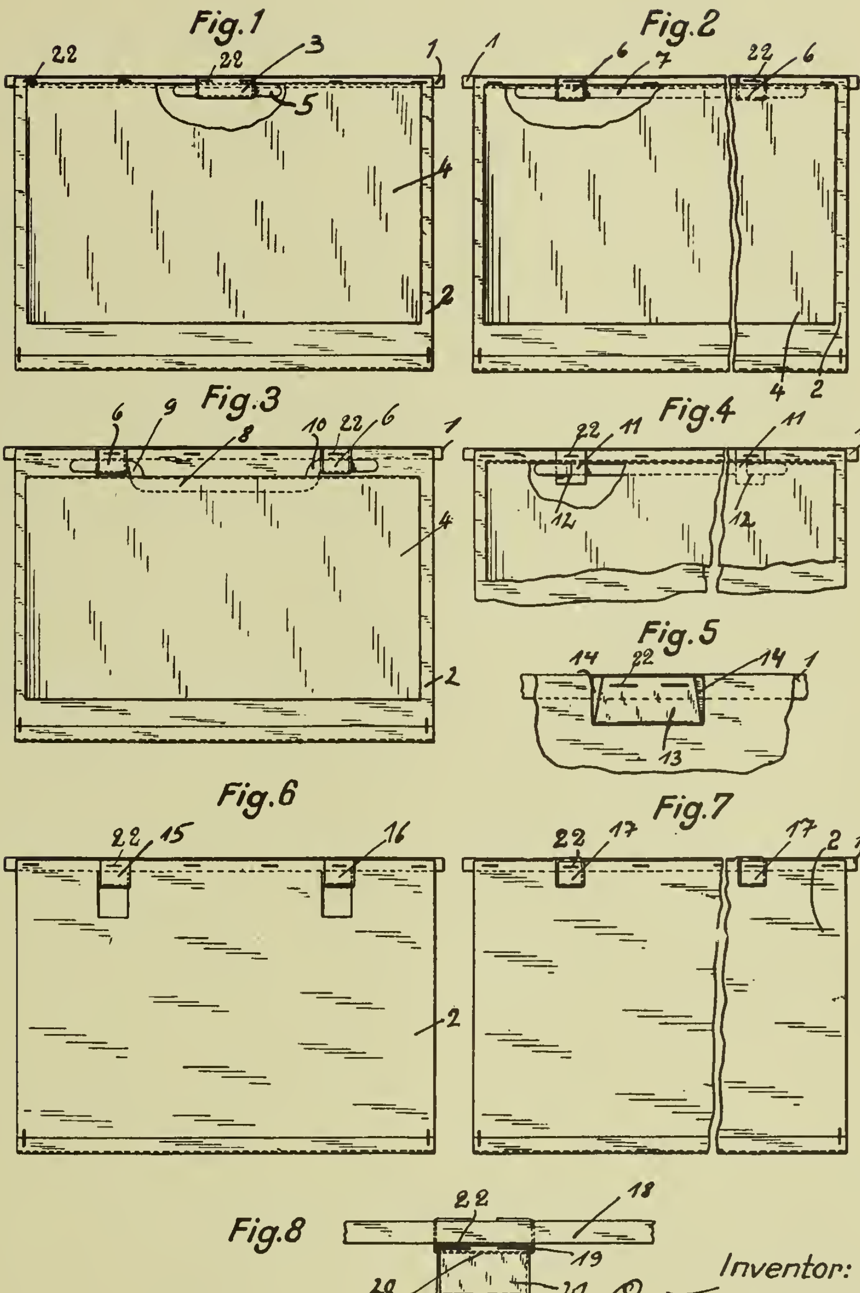
O. LAMPERTZ

CARD INDEX SYSTEM

Filed Oct. 14, 1941

Serial No.

414,965



Inventor:

O. Lampertz

By: Glascock Downing & Seebold

Published May 11, 1943 Serial No. 414,980

ALIEN PROPERTY CUSTODIAN

MANUFACTURING OF CONCENTRATES OF FAT-SOLUBLE ACTIVE SUBSTANCES, ESPECIALLY VITAMINES

Felix Grandel and Hans Neumann, Emmerich/Rhein, Germany; vested in the Alien Property Custodian

No Drawing. Application filed October 14, 1941

The subject matter of this invention is the manufacturing of concentrates of fat-soluble active substances, especially vitamines, from fats and oils of vitamine content or vitamine pre-concentrates, through alcoholysis of same by means of low monovalent alcohols, distilling off the newly formed low-boiling esters by vacuum and, if necessary, purifying the residual vitamine concentrate by re-dissolving them in monovalent alcohols and extraction of the stearines from the solutions by freezing.

It is known to make concentrates of fat-soluble vitamines and active substances by saponifying fats of vitamine content with alcalis, separating the unsaponifiable and therefrom obtaining vitamine high concentrates through re-dissolving and re-crystallizing. This method is largely applied in technics nowadays, although it entails many drawbacks. F. i. in saponifying there arise considerable losses of the neutral fat portion, the majority of biologically important by-products of the vitamines are destructed and the output of vitamine concentrates leaves much to be desired. Besides, the vitamine concentrates produced by saponification mostly are of a rather bad durability, as they no longer contain any concomitant materials of stabilising effect.

It is further known to prepare vitamines by high vacuum distillation. In this or similar methods (short-way distillation) the natural connection of the vitamines and by-products is destructed. One invariably gets "vitamine fractions," but never the totality of fat-soluble active matter. This will account for the fact that the very acidy concentrates retained through high vacuum distillation equally show poor stability. The neutral oil liberated of the vitamines that result by high vacuum distillation is of inferior qualtiy from a biological point of view and nearly always show an odour and flavour of fish and train-oil. Even after the application of refining methods, it is hardly serviceable as edible oil and has to be used in the soap industry. This method also requires costly apparatus, whose efficiency is but limited. In many cases, the yield of vitamines is far from being sufficient.

Moreover, it has been suggested to obtain concentrates of fat-soluble vitamines and active substances from vitaminous fats and oils through extraction (perforation) by solvents, particularly monovalent alcohols; by this method, however, vitamine concentrates of mean concentration (pre-concentrates) only will be the result.

Concentrates of fat-soluble active substances are likewise obtainable by applying chromatographic adsorption or absorption methods. But for the most part, the concentrates to be got in this way are acidy and must undergo additional treatment previous to their utilisation; besides, one does not extract the whole amount of fat-soluble active matter, but only fractional portions enriched with vitamine, as in the high vacuum distillation.

Other processes hitherto known for the manufacture of concentrates of fat-soluble active substances are without importance, since they could not succeed in practice.

Contrary to this process, in the method according to the invention, concentrates of fat-soluble active substances are produces from fats or oils of vitamine content or from pre-concentrates without applying any saponification, high vacuum distillation or chromatography. These pre-concentrates can be made f. i. by dissolving the vitaminous fats and oils in organic solvents which are little, if at all, soluble in aqueous monovalent alcohols, and then f. i. by shawing or perforation with aqueous monovalent alcohols (see patent application Serial No. 379,550).

The new method is based upon the understanding that through alcoholysis by low monovalent alcohols, the boiling-point of vitaminous fats and oils or their pre-concentrates can be brought down, thus making it possible by mere vacuum distillation and without high vacuum distillation, to separate the low-boiling esters so far as newly produced by alcoholysis, from the higher boiling fat-soluble active materials. It is most striking that neither in the alcoholysis nor distillation there appear any losses of biological active substances.

The vitaminous fats and oils or pre-concentrates made therefrom are f. i. alcoholysed by ethyl- or methylic alcohol in the manner already known, the liberated glycerine removed and the resultant esters of the monovalent alcohols by vacuum distillation separated from the residual fat-soluble active matter. The alcoholysis can be effected under normal or increased pressure, at normal or increased temperature with the aid of catalysers such as gaseous chlorhydric acid, sulphuric acid, β-naphthaline-sulpho-acid, sodium alcoholate etc. The glycerine nascent with the alcoholysis may be removed by washing with water, unless it separates down immediately. By vacuum distillation, it is easily possible to sever the low-boiling esters of the monovalent alcohols produced by alcoholysis, from the higher-boiling fat-soluble vitamines. The resultant con-

centrates of the fat-soluble active substances can be further purified by re-dissolving in monovalent alcohols, when stearines will be retained as by-product. The purified vitamine concentrate is absolutely acid-free and contains the entire amount of biological active substances as included in the raw oil, in unchanged form. Hence, these concentrates show good stability and optimal therapeutic efficiency.

One may equally proceed in such a way as to alcoholyse the vitaminous fats and oils only partially by monovalent alcohols, remove the liberted glycerine and separate the low-boiling esters by means of distillation. According to the extent to which the alcoholysis has been carried through, an oil more or less enriched with vitamines will be received.

The by-products such as methyl ester, glycerine and stearine, accumulating in the preparation of concentrates, represent valuable raw materials. Methylic esters and glycerine are products in brisk demand for the explosive, paper, soap- and pharmaceutical industries and the stearines constitute a highgrade starting material for the synthetical preparation of vitamine-D and hormons (corpus luteum).

In a technical view, the method according to this invention shows considerable advantages as compared with the processes already known. So, it is possible to manufacture big quantities of concentrates with relatively simple and generally known apparatus in common use.

Examples

(1) 100 kgs. wheat germ oil with a vitamine-E-content of 0,5% $\alpha+\beta$ tocopherol are heated with 400 g. of 100% methylic alcohol and 1 gramme sodium alcoholate in the autoclave under carbon dioxide at a temperature of 200° for five hours. The converted product is, after due cooling, thrice shaken with 200 ccm. of water to remove the glycerine, the watery extracts united and the glycerine therefrom extracted. The vitaminous methylic esters solved in the methanol are liberated of methanol and heated till boiling in 5 mm. vacuum. The limpid methylic esters of a slight yellowish tint distill over at 200–230°, yielding about 350 grammes methylic ester with an acid number of 0,2 and a vitamine-E-content of 0,005% $\alpha+\beta$ tocopherol. The residue liberated of methylic esters is severed from impurities through re-dissolution. The final product retained will be about 40 grammes of a dark red oil with an acid value 5,9 and a vitamine-E-content of 4,3% $\alpha+\beta$ tocopherol.

(2) 400 grammes of a vitamine-E-concentrate from maize germ oil (see patent application Serial No. 379,550) with an efficiency of 1,2% $\alpha+\beta$ tocopherol are heated in the autoclave with 400 grammes of 98% gaseous muriatic acid containing ethyl alcohol for five hours to 200°. After alcoholysis, the glycerine is removed by means of shaking with water and the vitaminous ethyl esters subjected to distillation in 3 mm. vacuum. At a temperature of 190–220°, the ethyl esters distill over, yielding about 350 grammes of ethyl ester with a slight vitamine-E-content. The residue to be again dissolved in ethyl alcohol and the solution cooled down in order to free it from stearines. The resultant oil of a dark red colour (about 40 grammes) shows a vitamine-E-content of 10,3% $\alpha+\beta$ tocopherol.

(3) 400 grammes cod liver oil with a vitamine-E-content of 3000 I. E. and a vitamine-D-content of 500 I. E. per gramme are alcoholysed with 800 ccm. methanol with admixture of 6 grammes sodium alcoholate and 1000 ccm. benzole by means of heating for 60 hours on the water-bath under reflux-condenser. On removal of the liberated glycerine, the vitaminous methylic esters are distilled off by vacuum at 1 mm. Hg. The methylic esters contain only small proportions of vitamine-A, whereas the residue (about 30 grammes), after re-dissolving in methanol will show a vitamine-A-content of 20,000 I. E. and a vitamine-D-content of 5000 I. E.

(4) 50 kgs. wheat germ oil with a vitamine-E-content of 0,213% $\alpha+\beta$ tocopherol and an acid value of 15,3 are heated with 50 kgs. methanol and 0,5 kgs. of concentrated sulphuric acid under backflow-condenser. After 20 hours the alcoholysis is interrupted and the liberated glycerine, the main proportion of methanol not converted and the sulphuric acid methylic esters separated by washing with water. Thereupon the methylic esters are distilled off by vacuum of 3 mm. Hg. at 200–230°, 29 kgs. methylic ester distilling over. As residue will be retained 21 kgs. wheat germ oil with a tocopherol content of 0,485% and an acid number 1,2. The final product can be conveniently used in veterinary as a germ oil enriched with vitamine-E for injections to combat sterility and Bang infection (caused by bacillus abortus).

FELIX GRANDEL.
HANS NEUMANN.

Published May 11, 1943

Serial No. 415,025

ALIEN PROPERTY CUSTODIAN

WEAVER'S SHUTTLE

Rudolf Schmidt, Passeck A/Iser, Germany; vested in the Alien Property Custodian

Application filed October 15, 1941

The known constructions of loom shuttles with hinged two-armed shuttle peg frequently have the drawback that the pirn or spool cannot be held fast on the peg quite safely, because the arms of the peg which approach one another by elastic forces present only a comparatively small elastic force for holding fast the pirn, this fact being due to the length of the arms. It is an object of the invention to improve the support of the pirns on the shuttle peg. According to the invention the arms of the shuttle peg are kept apart by a helical spring arranged between the two peg arms near the hinge or pivot of one or both peg arms on the loom shuttle. Because of the mutual support of the ends of the peg arms a strong elastic action between the peg arms can be obtained even by a comparatively small helical spring, this action being quite sufficient for holding fast the pirns on the shuttle peg with ample forces. For, it is an advantage of the construction according to the invention that due to the inserted helical spring the elastic force is acting just on a point where the sprawling force between the peg arms which is necessary to hold fast the pirns has the required effect. Nevertheless this sprawling force always with the necessary elasticity to prevent breaking of the pirns (for instance with wood pirns) or an undesired deformation (for instance with paper pirns). In order to permit removing of the pirn from the peg provided with supporting surfaces, an abutment is provided for the free end of that peg arm which is not hinged in the shuttle, this abutment permitting a pressing against one another of the two peg arms when the same are raised. According to the invention this abutment may have the form of an inclined gliding surface for the end of the free peg arm acted upon by the spring, the free end of this arm bearing upon the gliding surface in such a manner that the peg is held fast by the action of the helical spring inserted between the two peg arms, when the peg is lowered.

The drawings show a device according to the invention by way of example. In Figure 1 a section through that portion of a shuttle where the two armed peg is hinged is represented showing the mutual support of the peg arms according to the invention; Figs. 2 and 3 represent other modifications of the device according to the invention.

In the hollow part **1** of the shuttle **2** the peg comprising two arms **3** and **4** is hinged by way of a bolt **5** around which the peg arm **3** can be turned. The peg arms **3** and **4** are connected with one another at the end **6**. In the neighbourhood of the pivot **5** a recess **7** is provided in the peg arm **3**, a helical spring **8** being placed in the recess bearing against the free end **9** of the peg arm **4** so that the two peg arms are kept apart in elastic manner. The peg arm **4** is provided with an abutment **10** for holding fast the pirn set upon the peg. The free end **9** of the peg arm **4** cooperates with the inclined gliding surface **11** which advantageously is made of a metal plate secured to the shuttle body by means of a pin **12**. The bolt **13** serves to limit the lowering movement of the peg.

On turning the peg in the shuttle just described out of the hollow space **1** to such an extent that the free end **9** of the peg arm **4** bears against the surface **11**, the pirn can be set or removed, respectively, without any difficulty. However, in the lowered position slipping of the pirn from the peg is wholly prevented because the two peg arms are pushed apart by the spring **8** so that the pirn is held fast by the elastic force of the peg arms and moreover by the abutment **10**. The gliding surface **11** not only serves the purpose to press the two peg arms against one another to enable shifting of the pirn, but also in the constructional form shown in Fig. 1 holds fast the peg and thereby also the pirn in the lowered position. The peg arm end **9** pushed upward by the spring **9** bears upon the gliding surface **11** in such a manner that raising of the peg could be effected only by pressing the spring **8** i. e. with a comparatively great force. As Fig. 1 shows, the force which has to be overcome on raising the peg is at a maximum on the beginning of the raising movement and decreases during this movement. From this fact the advantage results that the peg is held fast with a very great force when the peg is in lowered position i. e. during the time of working.

If the free peg arm **4** has only to hold fast the pirn and does not serve to fix the peg in the lowered working position, constructions as shown by way of example in Figs. 2 and 3 may be recommended. Fig. 2 shows a construction of the peg wherein a leaf spring **14** (or the like) which is arranged separately from the free peg arm **4** is connected with the peg arm **3** and projects with its free end **15** towards the inclined gliding surface **11**. The end **15** of the leaf spring **14** bears against helical spring **16** in the same manner as the free end **9** of the peg arm **4** against the spring **8**. In order to prevent interfering of the peg arm **4** and the leaf spring **14** with one another, the peg arm **4** passes through an aperture **17** of the leaf spring **14**. The function of the shuttle corresponding to Fig. 2 is analogous to that of Fig. 1

with the difference that the two objects viz. holding fast of the pirn and fixing of the peg in the lowered position are distributed in the constructional form shown in Fig. 2 to the peg arm 4 and the leaf spring 14 whereas in the constructional form according to Fig. 1 both objects are fulfilled by the peg arm 4 alone.

According to Fig. 3 an arm 18 advantageously Z-shaped is provided bearing on one end against a bolt 19 and on the other end against a helical spring 20, this arm 18 cooperating with corresponding planes of the bearing 21 so that the peg is kept fast in the raised as well as in the lowered position. In this constructional form the free peg arm 4 also serves only the purpose to keep fast the pirn on the peg. The pirn can be removed from the peg when the peg in the raised position by pressing the free peg arm end 9 against the vertical part 22 of the arm 18.

RUDOLF SCHMIDT.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

R. SCHMIDT
WEAVER'S SHUTTLE
Filed Oct. 15, 1941

Serial No.
415,025

Fig. 1

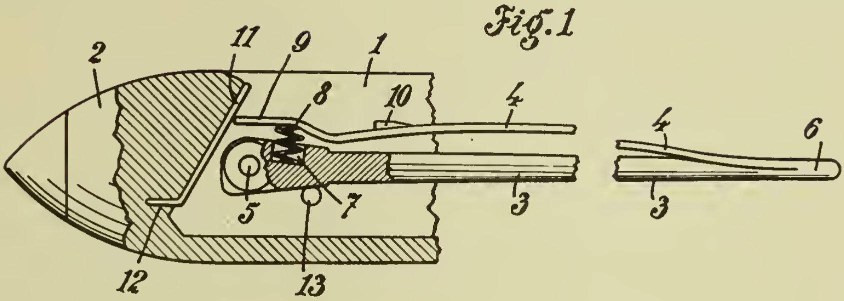


Fig. 2

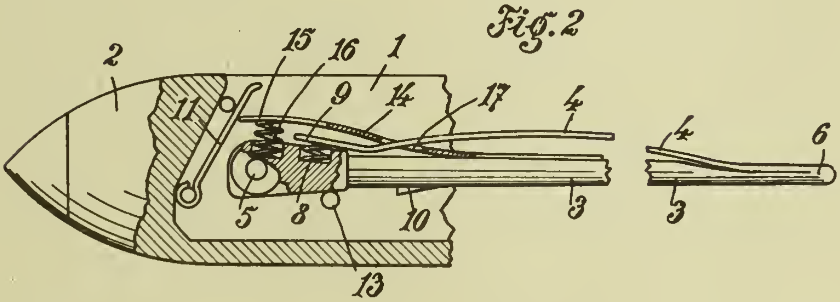
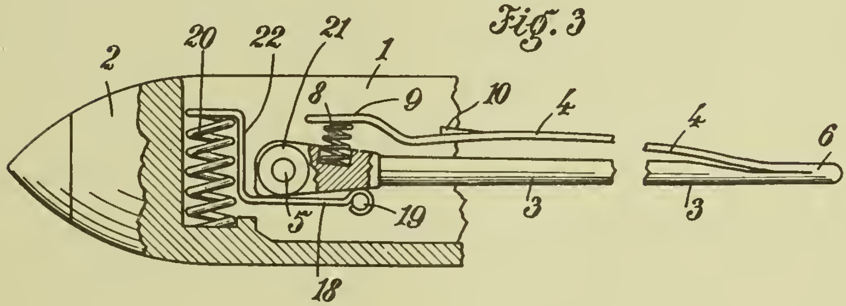


Fig. 3



INVENTOR
RUDOLF SCHMIDT
PER
Karl B. Mayr
ATTORNEY.

Published May 11, 1943

Serial No. 415,485

ALIEN PROPERTY CUSTODIAN

METHOD OF TREATING WOOD

Christian Julius Valdemar Andreasen, Frederikshavn, Denmark; vested in the Alien Property Custodian

No Drawing. Application filed October 17, 1941

This invention relates to the protection of wood against the parasites attacking it in sea water, particularly in salt water, especially the pile-worm (teredo) or the limnoria lignorum or limnoria terebrans. The invention also relates to wood protected against such attacks.

It is well known to provide wood with a coating, which cannot be pierced through by the parasites in question, particularly pile-worms and limnoria against which the wood has to be protected. The coating which has been most frequently used for this purpose consists of sheet iron and in case of isolated piles tubes of concrete or pottery have also been used. It is known, however, that such hard materials are not indispensable, as on the contrary even a heavy deposit of rust in the outer crust of the wood appears to have a protecting action.

In connection with the coating of the surface of the wood or as the only protecting means impregnation of the wood by creosote oil, molten naphthalene or by tannic acid in connection with an iron salt has also been employed, frequently in such a manner that only the layers of the wood adjacent the surface thereof are penetrated by such means.

These methods of protecting wood against the parasites of the kind described are very expensive if carried out in such a manner that they are effective. Moreover, if the wood is exposed to rough sea, the sheet iron after it has been somewhat deteriorated by corrosion will tend to be torn off and, on the places where the water is incessantly renewed and where it is consequently most exposed to the attacks of the said parasites, any kind of impregnation will also be open to a strong washing effect.

The object of the present invention is to avoid these drawbacks and to find a method which will be cheap and effective in preventing the attack of the said parasites such as pile-worms and limnoria against wood placed in sea water, particularly in salt water in the shape of piles, quays, bridges, duc d'Albes and the like, ships or parts thereof, fisher's out-fit etc.

With these general statements of the object and purpose of my invention I will now proceed to describe the embodiments thereof and the manner in which my invention is carried out and it will be understood that while I have described what may be considered a preferable embodiment of my invention, I do not limit myself to the precise conditions or proportions set forth, as they may be varied by those skilled in the art in accordance with the particular purposes for which they are intended and the conditions under which they are to be utilized.

The wood to be treated is of the kind usually employed for structures to be built in sea water such as harbours, quays, duc d'Albes, bridges etc. or for wood ships, such as pine, spruce, ash, beech, or oak etc. Experiments have particularly been carried out with pine, ash, beech and spruce. It has been found that the three former ones are comparatively easily provided with a well adhering protective layer according to the present invention, whereas this is somewhat more difficult in the case of spruce. In order to describe as completely as possible the difficulties that can be met with I therefore refer in the following particularly to the treatment of spruce.

It has been found that the protective coating made in accordance with my invention is most readily applied to the wood in its dry or seasoned condition, whereas it is comparatively difficult to obtain a protective coating that will adhere sufficiently to the surface under severe conditions in case of fresh wood still containing the juice in it.

The first treatment to be carried out in accordance with my invention is the formation upon the surface of the wood to be exposed to sea water a burnt or scorched layer. Scorching must be made so that the whole exposed surface of the wood is made evenly black and preferably a layer of charcoal of 1–2 mm in thickness is produced on it.

For this purpose the wood to be treated can be placed in a gas furnace with internal flame of a construction similar to those used for singeing pigs or an equivalent apparatus. In place thereof scorching can also be carried out by means of a portable burner, f. inst. a blow-torch and the use of a portable apparatus of this kind is indispensible when the protective coating is to be produced after the structure has been built, f. inst. in the case of ships, or if the object is of such a nature that it cannot be treated in a furnace.

The next step in the treatment is the impregnation and covering by an impregnating agent capable of binding to the charcoal. Such agents must also preferably be capable of penetrating to some degree into the outer part of the wood, as it has been found that if this is not the case, particularly in the treatment of spruce, the protective coating will have a tendency to loosen in the form of shells or flakes, thereby exposing parts of the surface of the wood to the attack of the parasites in question. It has been found by examining samples of spruce coated in various

manners under the microscope that in case the impregnating agent has not penetrated to some degree, f. inst. one or a few millimeters in the wood, there will be an interstice between the burnt and the protective coating, which interstice when the wood is placed in water will absorb water and push off the protective layer.

The impregnating agent which is called so in spite of the fact that it does not merely impregnate the wood to some small degree but also and particularly it forms a coating on the surface of the wood, may consist in tar, pitch or asfalt as well as similar materials which are capable of moistening charcoal and of absorbing and being absorbed by charcoal. It has been found that pitch and asfalt are not so well adapted as tar because they tend to produce coatings that will not adhere sufficiently to the wood. I have found that the best kind of tar which is also the cheaper one is coal tar. Preparations of tar, such as the black varnish, so called, used for treating the bottom of wooden ships, are also well adapted.

In order to apply the impregnating agent in such a manner that the coating will satisfy the above-named conditions in several cases it is sufficient to spread it out, preferably in a hot condition, over the surface of the wood by painting, spraying or in similar manner. This is particularly true in the case of the kinds of wood that are easily treated, such as pine, ash or beech, particularly when they are well seasoned.

In other cases, however, and particularly when the wood to be treated consists of spruce, I prefer to cook the charred wood in the impregnating agent for a considerable time.

In some cases, in order to obtain a sufficient coating, the impregnating agent is first applied in the hot condition and then in the cold condition, the purpose to be aimed at being to obtain both the penetration of the impregnation agent to a small depth into the wood and an unbroken coating on the surface of the wood. This coating when finished is preferably ¼–2 mm thick or more.

I have found that when the wood is difficult to impregnate, as f. inst. in the case of spruce, it is good to alternately cook it in the impregnating agent and place it in the cold impregnating agent which can be repeated for a few times. Thus, f. inst. a pile of spruce is first cooked in coal tar at a temperature from 100–180° C, preferably 160°, for 5 hours and then placed in coal tar for half an hour after which it is again cooked for 2 hours, once more placed in coal tar and once more cooked.

In this method the use of fresh unseasoned spruce is to be preferred.

The next treatment is what I have called mineralizing, which consists in incorporating into the coating of the impregnating agent particles or grains of some hard mineral substance. The same may be a powder or grains or shells. Thus ordinary sand can be used or the comminuted shells of oysters or mussels, the object being to impart to the coating a consistency or structure which cannot be readily penetrated by the parasites in question.

In order to make the coating form a practically homogenous layer which will not deteriorate when influenced by rough sea or tidal streams I prefer to use for the mineralizing treatment a mineral binding agent such as an air-bound or hydraulic mortar. I prefer a hydraulic cement such as Portland cement or Roman cement.

The mineraliser is applied by dusting it into the coating still wet or soft in so great a quantity as the coating will absorb. Alternately I may dip or turn the wood with the still liquid or soft coating upon it in the mineraliser or apply the same to the surface by means of rollers. Thus in case the wood has been cooked with the impregnating agent it can be placed still hot upon an area over which a thick layer of Portland cement has been spread out. When the wood is turned round as to apply the cement to all sides of it, the impregnating agent will retain all the cement it can possibly absorb and in a few minutes will solidify to form an elastic or plastic solid or semi-solid coating, from which any loosely attaching cement can easily be dusted or blown away. Other manners of applying the mineraliser is by air-spraying.

The mineraliser can alternately be mixed with the impregnating agent before the impregnating treatment but in this case it must be used in so small a quantity that it does not prevent the impregnating agent in penetrating into the wood. In case of the impregnation being repeated, the mineraliser can be mixed with the second or subsequent coatings alone, but I prefer first to impregnate and then to mineralise.

After mineralisation the wood is moistened by water if a hydraulic binder has been used and then it is stored for some days or better for a fortnight to harden the coating before its being used.

CHRISTIAN JULIUS
VALDEMAR ANDREASEN.

Published May 11, 1943 Serial No. 415,634

ALIEN PROPERTY CUSTODIAN

METHOD FOR THE CONCENTRATION OF CRUDE SUGARCANE-SAP

Jacob Deinema, Semarang, Java, Netherlands East Indies; vested in the Alien Property Custodian

No Drawing. Application filed October 18, 1941

The invention relates to a process to concentrate the sugarcane sap, without using precleaning-methods.

In the Netherlands Patent No. 39,465 is published a process for cleaning crude sugarcane sap. this sap, being precleaned, before being concentrated to at least 40% and at most 50% of dry substance.

In practice concentration of sugarcane sap is done by using an evaporator with so-called multiple effect.

Till now it was the ordinary way to clean the sap before admitting it to the evaporator thus preventing the inner tubes of the evaporator growing filthy.

Working the material before evaporation i. e. the minimal working which was needed for preparing the crude sap for concentration by evaporation existed of a defecation- crudesap cleaning.

This method was not chosen as a sap-purification but as the cheapest way to make a clear looking sap (thin sap), which is in the right condition to be evaporated in a normal multiple evaporator.

By using the procedure of Netherlands Patent No. 39,465 the difficulty which arose consisted of a special wanted battery of presses to work the defecation dirty sap; this battery should be the third needed in the sugar factory.

One battery of presses was already needed for filtering the first carbonized dirty sap and one for filtering the second carbonized dirty sap.

The whole factory therefore grew so complicated and expensive, that people switched over to the process of dirty sap on cane-trash.

Thus the crude sap was limed till the reaction became more or less alcalic, then boiled and settled down in a first deposit.

The dirty-sap thus obtained was limed again till the reaction became plain-alcalic; boiled again and settled down again afterwards for a second deposition. After all these processes a sufficient small quantity of dirty sap was left to be used with success in the mill-battery. (Dirty sap on cane trash process.)

By putting into practice the sap-purification method according to the Neth. Patent No. 39,465 the quality of thus obtained sugar did not come up to the expectations; this quality could not compete with the quality of normal carbonized sugar; fuel consumption did not come up to the expectations too.

This was due to the big losses of heat in the preparatory treatment.

Every 100 kg of cane provides 90 kg of crudesap with a specific heat of 0.9. This sap goes to the first settling down process with a temperature of 100° C and is cooled off to ±80° C, which is in accordance with a loss of heat of $90\times20\times0.9=1620$ cal. About 25% of this sap, i. e. 22.5 kg goes to the second settling down process, where it cools off again ±20° C. Loss of heat in this point is $22.5\times0.9\times20=405$ cal. At last 10% of the crude sap goes to the mill battery where it cools off from 80° C to 30° C; this means a loss of $9\times50\times0.9=405$ cal.

This last quantity of heat is only lost when it disappears in the cane trash or in the air near the mills by radiating. A part of it is absorbed in the crude-sap and thus not lost.

Estimating this loss on 50% of these 405 cal., we come to 200 cal.; the total losses of heat on 100 kg of cane being $1620+405+200=2225$ cal. In a normal caloric consumption of about 36000 cal in steam per 100 kg of cane, this means a loss of about 6% of the total steam consumption.

These circumstances being very aggravating, it will be clear that only one sugar factory followed this process till now notwithstanding a big economy in a yearly purchase of lime-stone and coke.

The difficulties of this process are not the carbonisation of the concentrated thin-sap but in the preparatory treatment of the crude sap before this is admitted to the evaporators.

The main fact is that the crude-sap stays for too long in the preparatory treatment (about two hours), which causes a loss of heat of about 6% of the total needed calories for the whole process; then, combination of time (about two hours), temperature (from 100° C to 80° C after cooling off), and pH (values of about 7.5 and even 8.0) are of such a degree that an important decomposition of the reducing sugars must evolve; by these, quality of sap and sugars is of course very badly influenced.

Entirely modifying the preparatory treatment is therefore badly needed when the manufacturing process of the Neth. Patent No. 39,465 should be universally adopted.

The time wanted for sedimentation and circulation of the crude-sap can be suppressed entirely for the full 100% by relinguishing the method of extracting the impurities before the sap is admitted to the evaporators.

Temperatures cannot be changed a bit because the sap must reach the boiling point in any case in the first evaporator. This lasts only a few minutes, in contrary to the two hours needed for the defecation purification.

Besides by applicating the Neth. patent No. 39465 method the sap has to be passed through the evaporator too.

pH must be high in the defecation process when a decent decomposition is wanted with only a small quantity of crude-sap.

By relinguishing the separation of impurities before evaporation, an alcalic reaction is not wanted and pH can be fixed at such a value that neither decomposition of saccharose nor that of reducing sugars will take place.

According to the invention this process simply involves addition of a small quantity of an alkaline reacting stuff to the crude sap till a pH.-value that decomposition of saccharose or of reducing sugars will be kept to a minimum, or even avoided completely; after this, the sap will be ready for the multiple evaporator.

Till now it was the popular opinion that such a method should not have the slightest chance of success according to fouling of the tubes within a very short time, i. e. 24 or 48 hours—then heat tiansmission would be reduced to zero. (Neth. patent No. 39465, page 2, lines 62–75).

This statement involved the popular idea that the suspending elements would settle down very soon on the tubes.

By observing a lot of phenomena in sugar-factories it was concluded that this opinion was a mistake. Elements of insoluble stuff being fibres of cane-trash or crystals of precipitated salts etc. have no tendency of settling down on the tubes along which they are streaming.

Considerations from a chemical and technical point of view showed that incrustations on tubes originate from crystals which come into existence during the time the sap is flowing along the tubes. This was proved by the following observation. During a second carbonatation with a great delay of crystalization an 8″ waste pipe was choked down within a few weeks to a 4″ passage by layers of $CaCO_3$.

As soon as the delay of crystalization was stopped by grafting the sap which was to be carbonated with crystals already in existence no choking down of the tubes could be observed even during a four-month campaign, while at least the same quantity of suspending elements passed the tubes per time-unit.

From this, could be concluded that an evaporator should not foul quickly when crude-sap and precipitation were sent to this apparatus but besides this could be expected that the evaporator will grow dirty in a much slower degree, because the crystals always coming into existence during the evaporation process will not only precipitate on the tube pipes but also on the layers already present and so form an excellent base for crystallisation.

A test evaporation for this process was then put into practice. After 12 days' use the tubes were inspected and they were found completely clean.

After 23 days' use the transmission-coefficient practically did not change at all, therefore conclusion was right that the evaporation had grown less dirty in comparison to the purified sap obtained by the usual sap defecation where an apparatus had to be cleaned thoroughly after a 3 to 4 weeks' use.

According to the invention every preparatory purification of the crude-sap before submitting it to a concentrating process can be omitted now.

By this all losses are abolished connected inevitably to a preparatory purification; this result only is already a very important technical effect.

Besides a lot of apparatus included their pumps and pipes with their service and upkeep can be omitted, as two settlers, one defecation-pan and several recipients.

Finally the inevitable break down of reducing sugars during preparatory purification is avoided, therefore a considerable better quality of sugar will be obtained.

By putting this process into practice the normal evaporator had to be improved.

It is not necessary to change the tubes, but inlet- and outlet-pipes and casing conducts between the separate bodies had to be chosen with a wider passage.

Of course this depends upon the chosen size of the evaporator; further alterations are not necessary.

As a result of this new idea the proper sap-purification can be applied now to a concentrated, neutralized crude sap, which will give an entirely new aspect to the sugar-fabrication.

JACOB DEINEMA.

Published May 11, 1943 Serial No. 417,719

ALIEN PROPERTY CUSTODIAN

VALVE GEAR FOR PISTON ENGINES OR MACHINES

Paul Reichsfeld, Vienna 1, Germany; vested in the Alien Property Custodian

Application filed November 3, 1941

This application is a continuation of my copending application Serial No. 144,717, filed May 25, 1937. This invention relates to valve control gear for piston engines and machines, and more particularly for piston compressors.

Regulating devices for internal combustion engines in which the cylinders rotate about their axes while the fuel is admitted axially through the cylinder head are known. With such arrangements the ports for admission and discharge in the stationary cap are disposed in the same radial distance from the center and registering with a single common port in the cylinder head. Types of valve control gear for prime movers, more particularly steam engines, are also known, consisting of a continuously rotating control disc which fulfills the function of the control member, and which is provided with inlet and outlet ports disposed in offset relation to each other, and of a rotatable closing disc which is adapted to regulate the degree of admission to the cylinders. All these known types of construction, insofar as they relate to internal combustion engines, make no provision for varying the respective duration of admission, compression and exhaust.

The present invention relates to a valve control, for piston machines, particularly piston compressors, having a cylinder coupled for rotation with the crank-shaft of the machine and adapted to rotate in a stationary cap, characterized by the provision in the cylinder head and also in the cap head of separate ports disposed at different radial distances from the axis of rotation of the cylinder head in such a way, that the admission ports are disposed near the axis of rotation and the discharge ports in the margin zone of the rotating cylinder. The ports are arranged concentrically to each other and also to the axis of rotation, and so arranged and dimensioned that on rotation of the cylinder head these ports coact with each other and control the admission to and discharge from the working cylinder, independently one of the other, in a manner appropriate to the working cycle of the machine.

By disposing the control openings on rotating cylinders in this way, the result is obtained, that the medium such as air, gas or the like entering the cylinder near the axis of rotation will be distributed by centrifugal force from the middle of the cylinder towards the margin of the cylinder and compressed in the margin zone, while the medium leaving the cylinder is forced by centrifugal force through the outlet openings arranged near the margin of the cylinder. The rotating cylinder acts in the manner of a separator and compresses the medium, which has entered the cylinder near the axis of rotation towards the marginal zone, so that in the middle where the inlet openings are disposed a suction effect appears and a greater amount of the medium is sucked in, while the medium which is to be discharged is pressed by the centrifugal effect in the margin zone, where the outlet openings are disposed and is forced through said outlet openings, whereby a more effective emptying of the cylinder is obtained. The disposition of the admission ports near the center and of the discharge ports in the margin zone in combination with a rotating cylinder, according to the invention, therefore, when used for compressors, or pumps, increases the volumetric effect, and when used for engines, such as internal combustion engines increases the output in such a manner as is only obtained by a super charging device.

The process, according to the invention, therefore, is characterized by introducing the gaseous medium into the rotating cylinder near the axis of rotation, distributing and compressing the said medium towards the marginal zone of the cylinder by centrifugal force exerted by the rotation of the said cylinder and afterwards discharging the said medium under the action of the said centrifugal force at a place in the margin zone of the said cylinder.

Moreover the valve gear according to the invention is particularly simple. This simplicity of construction is due to the fact that the valve gear consists substantially of only two parts, namely, a rotating part formed by the cylinder head itself, and a stationary part formed by the cap, to which parts the inlet and outlt conduits may be directly connected.

The control means provided by the present invention is of particular advantage when applied to compressors, especially to compressors used in refrigerating machines.

By virtue of the present invention it becomes possible, owing to the provision of the ports in the head of the cylinder cap, to vary the effective length of these ports by the insertion of sliding shutters or diaphragms, by which means the degree of compression or the rate of admission of the cold vapor may be regulated as required to suit varying conditions.

The arrangement may be such that in the stationary cap there are provided control ports which are adapted to register temporarily with the ports in the cylinder head, and the lengths of arc of which are adjustable independently of one

another by means of shutters, diaphragms, or similar means, for the purpose of separately altering the length of the openings period of the outlet and of the inlet.

In the accompanying drawing several constructional examples of the invention are illustrated.

In the drawing:

Fig. 1 is a sectional view of a machine equipped with the control means according to the invention.

Fig. 2 shows an arrangement of the control ports in the cap head and in the cylinder head for a compressor or the like.

Fig. 3 shows an arrangement of the control ports in the cap head and in the cylinder head for a machine working on the four-stroke principle.

Fig. 4 is an elevational view of the end of the cylinder showing means for varying the length of the orifice of the ports in the cap.

Fig. 5 is a sectional view taken on the line V—V of Fig. 4.

Fig. 6 is a section taken on the line VI—VI of Fig. 4.

Fig. 1 shows a constructional form of the invention, in which one part of the valve gear is formed directly by the cylinder itself. The cylinder **1** is journalled so as to rotate about its axis in a cap **2** and in a bearing **3** and is driven from the crank shaft **4** trough a bevel wheel gearing **5**, **6**. The end wall or head of the cylinder **1** bears in a fluid-tight manner against the cap **2** and is provided with ports which, when the cylinder rotates about its axis are adapted to register temporarily with ports provided in the end wall of the cap **2**.

Fig. 2 shows an arrangement of the control ports in which slot-shaped ports are provided in the stationary cap head, and hole-shaped ports in the rotary cylinder head or an arrangement for use in a compressor. The end wall of the cylinder is provided with the inlet port **7** and the outlet port **8** and adapted to rotate in the direction of the arrow, while the stationary end wall of the cap **2** is provided with an inlet port **9** and an outlet port **10**. The control means is shown in the position in which the intake commences, that is to say about when the piston has reached its top dead centre position. On the end wall of the cylinder rotating out of the position shown in the direction of the arrow, the inlet port **7** registers for a period with the port **9** and the inflow into the cylinder continues as long as the port **9** which is in the form of an arc of a circle slides past the opening **7**, the length of the orifice of the port **9** determining the length of the inflow period. At the same time however, the outlet port **8** moves in the direction of the arrow during which the outlet opening **10** in the end wall of the cap or cap head bears against the solid part of the cylinder head and is thereby kept closed. As the cylinder head continues to rotate, the inlet port **7** passes over the end of the port **9** in the cap head, so that this opening is closed by the solid part of the cap head. Compression is effected by virtue of the fact, that during the compression stroke of the piston the exhaust port **8** slides against the solid part of the cap head until it registers with the exhaust port **10**, the length of the slot determining the degree of the compression. As the rotary motion of the cylinder continues the outlet port **8** registers with the outlet port **10**, and the duration of the opening period is determined by the length of the orifice of the port **10**. As the drawing shows, the openings controlling the inlet are arranged on a different radius from that on which the opening controlling the outlet is disposed so that the openings controlling the inlet and those controlling the outlet have no influence on one another, the inlet ports being arranged near the center of the cylinder and the outlet ports in the margin zone. After the completion of one revolution of the crank shaft the cycle of operations in the cylinder recommences, since this engine operates on a two-stroke cycle. For this reason in this engine the rotary cylinder must be driven by the crank shaft with a ratio of transmission of 1:1.

Fig. 3 shows the arrangement of the control ports for a piston machine working on the four-stroke principle, or an internal combustion engine. As the cylinder head rotates, the hole-shaped inlet port **11** therein registers with the inlet slot **12** in the cap head, while the outlet slot **14** coacts with the hole-shaped outlet port **13** to control the exhaust. As may be seen from the figure of the drawing, it is possible, by suitable dimensioning of the slots as regards their length, to obtain the most favorable duration of opening for the admission and for the exhaust.

By arranging the slots and openings at different radial distances from the axis of rotation it is possible to obtain opening periods of the valve gear of different duration for the suction and for the exhaust.

The control ports may also be provided in a cylinder head or cylinder end formed in accordance with any body of rotation, and be adapted to coact with openings in a correspondingly shaped cap. The arrangement of the control ports directly in the cylinder head has the advantage that the clearance is reduced to a minimum. The slot shaped ports may also be arranged in the cylinder head and the hole shaped ports in the cap head.

The valve gear according to the invention may of course also be used for double acting piston engines or machines, in which case both cylinder ends or end walls may be provided with ports adapted to coact with caps (**2**).

The rotary valve member or the cylinder may be driven by any suitable transmission members, such as toothed wheels (Figure 1), a chain or the like.

The valve gear or control means may also be so constructed that the openings periods can be altered by varying the effective length of the slots, in which case the adjustable slots will be provided in the stationary part of the control arrangement. The effective length of the control slots may be varied by the insertion of shutters or slidable shutter-like members.

Figs. 5, 6 and 7 show an arrangement for a compressor, according to Fig. 3, in which the length of the slot-shaped control ports is variable. In the control slots for discharge **10** and for admission **9** in the cap head **2'** there are inserted shutters **15** and **16** which slide with a tight fit by means of tongues **17**, **18** against the cylinder head **1'**. The shutters **15** and **16** are guided in recess **19** in the cap head between the cap head **2'** and a covering plate **20** having holes to which are connected the conduits **21**, **22**. The shutters **15**, **16** are provided on their edges with teeth **23** meshing respectively with gear wheels **24**, **25** by means of which the shutters may be adjusted in the arcuate guideways **19** in the cap by rotation of the shafts **26**, **27**. Since the space

beneath the shutter 16 is closed off from the interior of the conduit 22 the control means are cut off when the control port 9 in the cap head 2′ is covered over by the tongue 18 as shown.

The medium to be compressed is introduced into the rotating cylinder 1 near the axis of rotation through the admission ports 7, 9, arranged in the cylinder head 1′ and in the cap head 2′ respectively while the piston is moving down. At the same time the medium will be distributed and compressed towards the margin zone of the cylinder 1 by centrifugal force exerted by the rotation, thereby allowing a greater amount of the medium to enter the cylinder. Thereafter compression follows by upward movement of the piston and discharge under the action of the centrifugal force through the discharge ports 8, 10, arranged in the cylinder head 1′ and in the cap head 2′, respectively, the admission and discharge periods being variable by the adjustable shutters 16 and 15, respectively.

The control arrangement according to the invention is applicable with advantage to other kinds of machines and the like operating with pistons, such as for instance compressed air motors, steam engines, pumps, internal combustion engines and the like.

PAUL REICHSFELD.

PUBLISHED | P. REICHSFELD | Serial No.
MAY 11, 1943. | VALVE GEAR FOR PISTON ENGINES OR MACHINES | 417,719
BY A. P. C. | Filed Nov. 3, 1941 | 2 Sheets-Sheet 1

Fig. 1

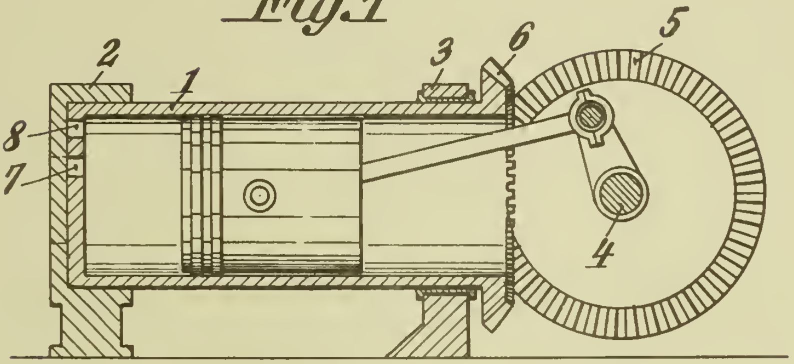


Fig. 2

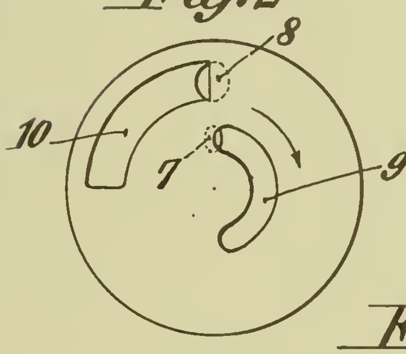


Fig. 3

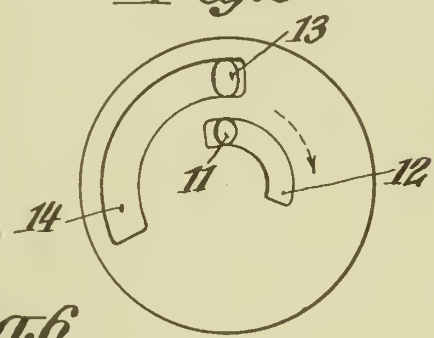
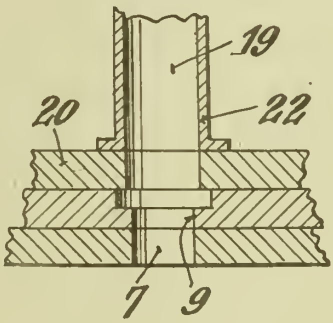


Fig. 6



Inventor,
Paul Reichsfeld

By: Glascock Downing & Seebold
Attys

PUBLISHED MAY 11, 1943. BY A. P. C.

P. REICHSFELD

VALVE GEAR FOR PISTON ENGINES OR MACHINES

Filed Nov. 3, 1941

Serial No. 417,719

2 Sheets-Sheet 2

Fig. 4

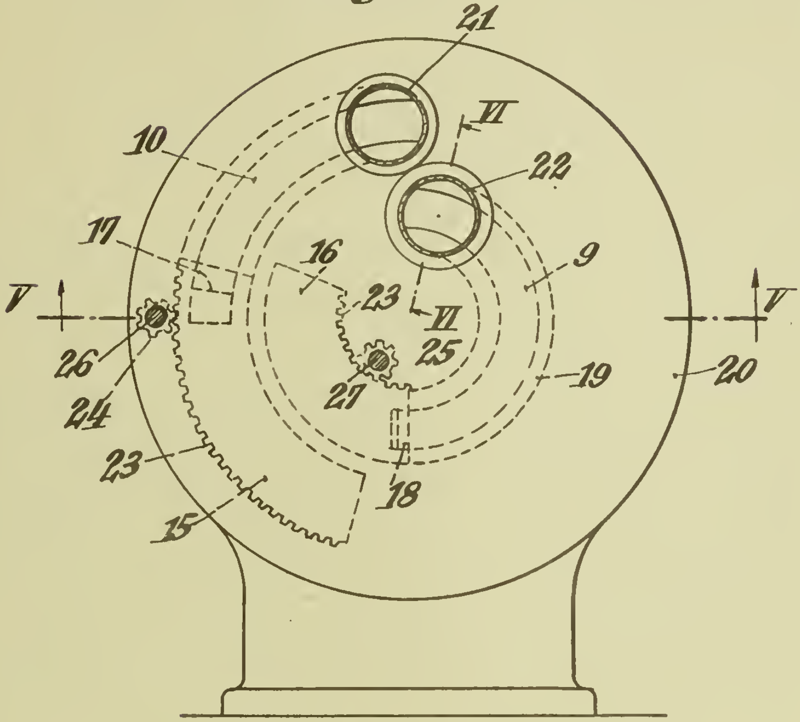
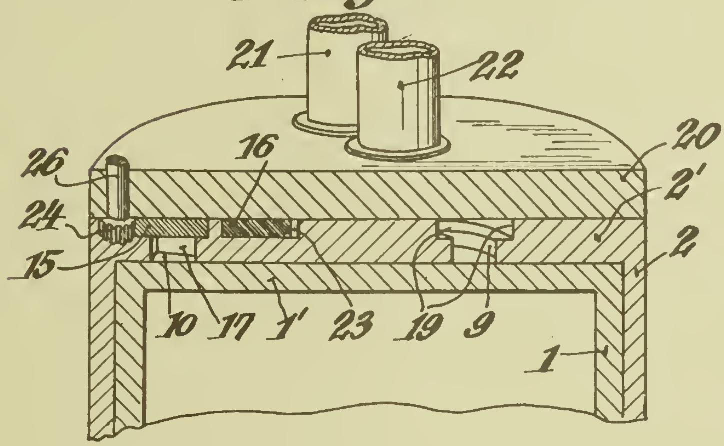


Fig. 5



Inventor,
Paul Reichsfeld

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 418,665

ALIEN PROPERTY CUSTODIAN

FREE PISTON MOTOR COMPRESSOR

Franz Neugebauer, Munich-Allach, and Ludwig Wagenseil, Munich-Obermenzing, Germany; vested in the Alien Property Custodian

Application filed November 12, 1941

This invention relates to improvements in free piston motor compressors provided with oppositely moving flying masses, more especially to the cross-sectional outlines of the pistons and the arrangement of the gearing elements connected thereto.

In free piston motor compressors of the kind described the flying masses are connected with one another by a gearing ensuring their synchronous operation. Mechanical gearings of this kind are, as a rule, subdivided in two halves symmetrically arranged to the longitudinal axis on both longitudinal sides of the engine in order to avoid unilateral stresses. Rack-and-pinion or link gears are mostly used for this purpose. In the first case two racks are secured to each of the flying masses extending parallely to the axis of the engine. The racks engage diametrically a pinion journaled on the engine casing. In the second case the pinion is replaced by a two-armed link. Each of its ends is engaged by a link the other ends of which are jointed to each of the flying masses. As the halves of the gearing have to be placed outside the walls confining the cooling space, the exhaust crown or other implements attached to the motor cylinder, the distance of the gearing elements from the axis of the engine becomes relatively great. If the compressor pistons have a radius greater than this distance, the gearing elements to be connected with the flying masses can be directly secured to these compressor pistons. Otherwise it would be necessary to connect a cross-head to a prolongation of the motor piston inserted between the motor piston and the compressor piston, this cross-head projecting outwards, for instance, through slots in the wall of the correspondingly prolonged motor cylinder, and to secure the gearing elements, to be connected with the flying masses, to the ends of the cross-head. Such cross-head not only complicates the engine, but above all entails the drawback that the engine, and also the flying mass are elongated by the length of the stroke of the cross-head. Hereby firstly the required place and the weight of the engine are enlarged, and secondly also the weight of the flying mass is increased, whereby the number of strokes per unit of time is reduced and in accordance the effect of the engine is diminished.

The object of the present invention is to afford the possibility of directly connecting the gearing elements to be combined with a flying mass to a compressor piston even in the case that the radius of the compressor piston is smaller than the required minimum distance of the halves of the gearing from the axis of the engine.

It may be noted that this requirement above all presents itself in connection with multistage compressors. If in this case a plurality of compressor stages is connected with a flying mass, the required compensation of forces and works involves that the piston of the lowest stage combined with this flying mass does not exceed a certain dimension. This is especially true when the compressor is symmetrically subdivided, i. e. when on each side of the engine a complete multistage compressor is arranged. On the other hand, if, for instance, in a two-stage compressor the piston of the first stage is connected with the one flying mass and the piston of the second stage with the other flying mass, the compressor piston of the first stage may, it is true, be given a sufficiently great diameter to connect the gearing directly with this piston, but this is impossible with the piston of the second stage.

According to the invention, even in the case that the radius of the greatest of the compressor pistons secured to the flying mass is too small to allow its connection with the gear elements within its circular face, this connection is rendered possible by giving this compressor piston an elongated cross-sectional outline deviating from a circle so that its projection from the axis of the engine in the direction of the greater geometrical axis becomes greater than the radius of the cylindrical piston, whereas the extension in the direction of the smaller geometrical axis is smaller than this radius.

This part of the compressor piston widely projecting from the engine axis is used for connecting the gear elements. The cross-sectional outline of this non-cylindrical piston may be, for instance, a rectangle or a figure composed of one rectangle and two semicircles or an ellipse, a rhombus or the like. The "cylinder" in which this compressor piston reciprocates is given the same cross-sectional form as the piston. It is true that the wall of such a cylinder is less resistant to inner pressure than the usual cylindrical wall. But owing to the fact that here as a rule relatively low pressures are to be contemplated (in multistage compressors only the lower stages) the satisfactory reinforcement of the walls presents no difficulty. Likewise the packing of the non-circular piston may be satisfactorily effected by packing rings similar to the usual piston rings and yieldingly pressed against the cylinder wall so that, besides the more complicated manufacture of the non-circular pistons

and "cylinders" no difficulties will occur. On the other hand, we obtain the advantage that the required place and the weight of the engine as well as the weight of the flying mass are diminished, even when the connection of the gear elements with the compressor piston is allowed only at one side of the engine. Likewise the space required for disconnecting the engine is correspondingly diminished. The invention is especially valuable in case it allows the connection of the gear elements at both sides of the engine because then the advantages: reduction of required place and reduction of weight of the engine and the flying mass are fully utilized.

The invention is illustrated, by way of example, in the annexed drawings of which

Figs. 1 to 7 show a free piston motor compressor with four-stage compression, Fig. 1 being a longitudinal cross-sectional side view, and Figs. 2 to 5 being vertical cross-sections on the lines II—II, III—III, IV—IV, and V—V of Fig. 1 respectively.

Fig. 6 is a longitudinal cross-sectional plan view, and

Fig. 7 shows the moving parts (flying masses) of the engine in side elevation.

Figs. 8 and 9 show the same flying masses as Fig. 1 in connection with another coupling gear, Fig. 8 being a side elevation and Fig. 9 a vertical cross-section on the line IX—IX of Fig. 8.

Figs. 10 and 11 show a special arrangement of the coupling gear, Fig. 10 being an axial longitudinal cross-section and Fig. 11 an axial cross-sectional plan view.

Figs. 12 to 18 show different shapes of compressor pistons according to the invention.

Figs. 19 to 22 show a free piston motor compressor provided with two compressor stages, Fig. 19 being an axial cross-sectional side view, and Figs. 20 to 22 being vertical cross-sections on the lines XX, XXI, and XXII of Fig. 19.

In the free piston motor compressor represented by Figs. 1 to 7 the two motor pistons **2**, **3** oppositely reciprocate in a motor cylinder **1**, the left motor piston **2** being connected with the compressor piston **5** of the first stage and with the compressor piston **8** of the fourth stage. The piston **5** in the compressor cylinder **9** acts upon the compressor space **15**, the compressor piston **8** acts upon the compressor space **18** situated in the interior of cylinder **9**.

The motor piston **3** is connected with the compressor piston **6** of the second stage which acts in the compressor cylinder **10** upon the compressor space **16**. The compressor piston **7** of the third stage is in this example shown arranged concentrically to the compressor cylinder **10** and integral therewith; it acts upon the compressor space **17** bored into the motor piston **3**. To ensure synchronous reciprocation of the two flying masses formed by pistons **2**, **5**, **8** and **3**, **6** respectively a rack-and-pinion gear of well-known construction arranged symmetrically to the axis of the engine is used. If the compressor piston **5** of the first stage were of cylindrical shape as indicated by the dotted circle C in Fig. 1, the racks **21**, **22** to be connected with the flying mass **2**, **5**, **8** could no more engage this piston because in view of the cooling jacket **30** and the exhaust crown **31** to be provided on motor cylinder **1** they must be arranged in so great a distance from the axis of the engine that they lie outside the circular face C. In order to nevertheless allow this connection, the cross-section of the piston **5** is made rectangular as shown in Fig. 2, so that the racks **21**, **22** fall within the outline of this rectangle. The walls confining the compressor cylinder **9** are correspondingly plane. To reinforce these walls against the inner pressure they are encompassed, as shown in Fig. 2, by an elliptic mantle **32** vaulting the plane walls and connected with said walls by longitudinal or transverse ribs. The space between both cylinder walls may serve as an additional receiver for scavenging air. The space **19** formed between the piston **5** and the cylinder **9** on the side turned toward the motor part serves as scavenging pump in the well-known manner. The racks **21** and **22** are in this case passed through air-tight holes in the front wall **33** and in the wall **20** of the compressor (Fig. 6). On the right side of the engine the racks **23**, **24** engaging the flying mass **3**, **6** are connected to the cross-head **25** integral with the motor piston **3** and projecting outwards through longitudinal slots **26**, **27** of the motor cylinder **1**. The racks **21**, **23** and **22**, **24** lying on the same respective side of the engine engage at diametrically opposed points the pinions **28**, **29** respectively. Each of these pinions is rotatably, but not shiftable journaled on the mantle **30** of the motor cylinder **1**.

By shaping the piston **5** of the first compressor stage according to the invention with a flat rectangular outline, on the left side of the engine, place is saved which otherwise would be required for lodging and reciprocating the cross-head which would have to be provided in the case of a compressor piston having the usual circular cross-section. Consequently, the total length of the plant is essentially reduced. It is in the same sense that act in the example shown the lodgment of the high pressure cylinder **12** in the low pressure cylinder **9**, known in itself and the lodgment of one compression stage (working space **17**) in the motor piston. Hereby we attain that this engine comprising a four-stage compressor requires no more space than a normal engine working with the same stroke of flying masses and having only a two-stage compressor with one stage at each side of the engine.

Figs. 8 to 11 show the flying masses of the same engine provided with link-gearing. On each longitudinal side of the engine a two-armed lever **36** is journaled on a pivot **35** fixed in the frame of the engine. The ends of this lever **36** are engaged by two links **37** and **38**. The other ends of the links **37** are linked to the rectangular piston **5**, and the other ends of the link **38** are jointed to the cross-head **39** integral with the piston **3**. Also in this case the enlarged lateral projection of the rectangular piston **5**, as compared with the circular outline C in Fig. 2 permits of the immediate connection of the gear elements **37** with the piston.

The advantages of the invention thus appear similarly when using this kind of connecting gear. In order that in this case the space **19** (on the right side of the piston **5**) may also serve as working space, for instance, of a scavenging pump, the links **37** (Figs. 10, 11) oscillate in pockets **52** originating from the piston **5** and tightly passed outwards through the front wall **20**.

The outline of the piston **5** shown in Fig. 12 may be imagined as being produced by cutting off two opposite segments from a circular face. This form is advantageous for manufacturing the compressor cylinders. Into a cylinder **40** with cylindrical bore two segmental pieces **41**, **42** are inserted so that the plane walls of these segments

together with the uncovered parts of the cylinder **40** encompass the piston **5**.

In Fig. 13 the outline of the piston **5** is formed by a rectangle and two semicircles.

Fig. 14 shows an elliptic outline, Fig. 15 a rhombic outline with rounded angles of the piston **5**.

According to Fig. 16 the rhombus is so flat that its sides become tangents to the motor piston **2**.

To further reduce the effective face of the compressor piston **5**, one may make a stationary piston project through the compressor piston and into the motor piston, as, for instance, the piston **7** into the piston **3** (Fig. 1) so that as the effective cross-section of the piston may be considered the hatched face in Fig. 17.

If it is desired to further diminish the effective cross-section of the piston, besides the one stationary piston arranged concentrically to the axis of the engine, alongside the latter other stationary pistons may be provided tightly penetrating the compressor piston. The effective cross-section of the piston then corresponds to the hatched face in Fig. 18.

Figs. 19 to 22 show a free piston motor compressor provided with a two-stage compressor.

The piston **50** of the first compressing stage has in this case a diameter sufficient to permit of the immediate connection of the racks **21**, **22** of the coupling-gear with this piston having the usual cylindrical form. However the piston **60** of the second compressing stage, when shaped in the usual form, becomes only a little greater than the motor piston. Therefore in the present example this piston is given an elongated outline in the form of a flat ellipse as shown in Fig. 22. For reinforcing the wall **70** of the elliptic compressor cylinder a second cylindrical wall **71** is placed around it, and between both walls **70** and **71** longitudinal and transverse ribs are provided, so that the cylinder sustains the relatively high pressure of the second compression stage. The racks **23**, **24** may now immediately engage the piston **60** of the second compressing stage so that again no cross-head is required for connecting the racks **23**, **24** to the flying mass **3**, **60**. Again the length of the engine required for lodging and reciprocating the cross-head is saved, whereby the place required and the weight of the engine and that of the flying mass are correspondingly reduced. This engine with the two-stage compressor needs no more place than a quite symmetrical engine having one one-stage compressor on each side, the piston of which permits of connecting the elements of the coupling-gear to be attached to the flying masses immediately with these pistons.

The space **63** situated at the left side of the piston **60** turned toward the motor part may either communicate with the atmosphere or with a working space serving, for instance, as an additional scavenging pump, a buffer or the like. The coupling gear is in this example wholly lodged in the scavenging-pump casing **75** connecting the compressor cylinder **59** of the first stage with the cylinder **70** of the second stage.

FRANZ NEUGEBAUER.
LUDWIG WAGENSEIL.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. NEUGEBAUER ET AL
FREE PISTON MOTOR COMPRESSOR
Filed Nov. 12, 1941

Serial No
418,665
3 Sheets-Sheet 1

Fig. 1

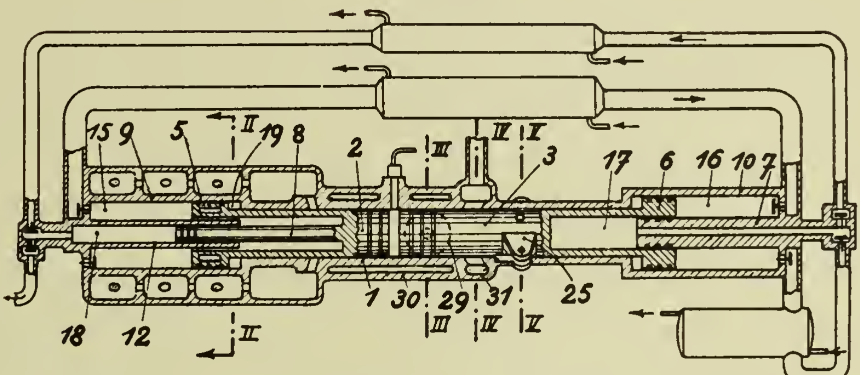


Fig. 2

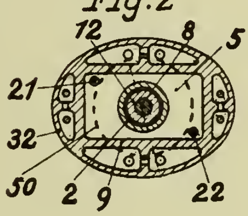


Fig. 3

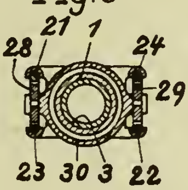


Fig. 4

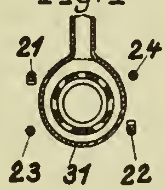


Fig. 5

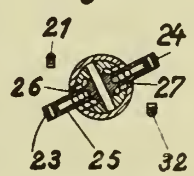


Fig. 6

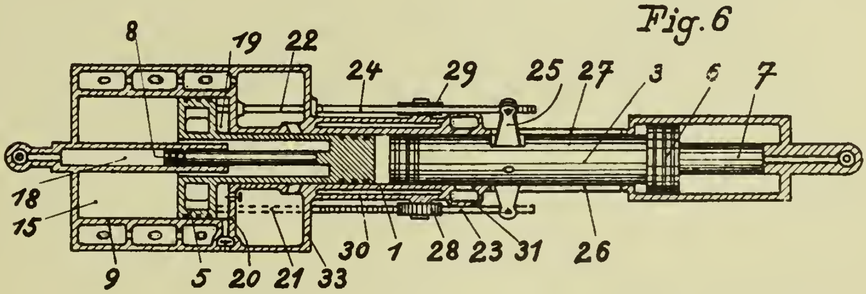
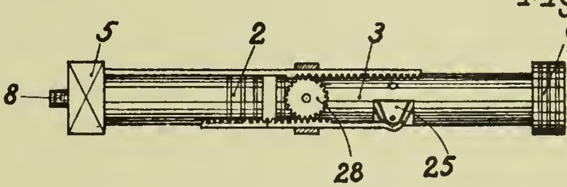


Fig. 7



Inventors:
Franz Neugebauer, Ludwig Wagenoiu
by Paul Fischlund
Attorney

PUBLISHED
MAY 11,1943.
BY A. P. C.

F. NEUGEBAUER ET AL
FREE PISTON MOTOR COMPRESSOR
Filed Nov. 12, 1941

Serial No
418,665
3 Sheets-Sheet 2

Fig.9

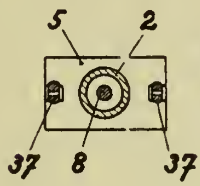


Fig.8

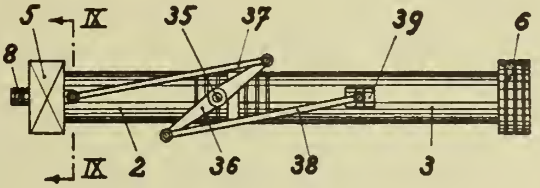


Fig.12

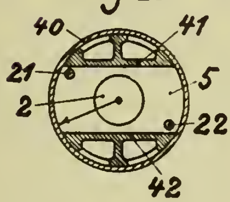


Fig.13

Fig.14

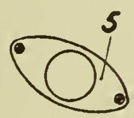


Fig.15

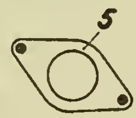


Fig.16

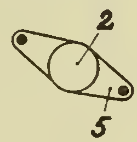


Fig.19

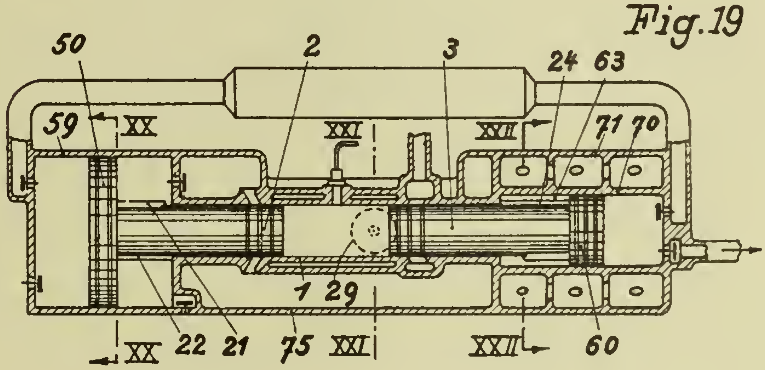


Fig.20

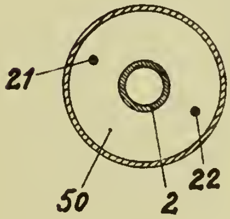


Fig.21

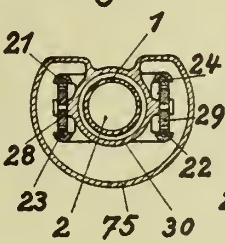
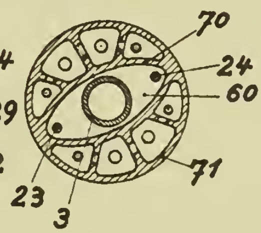


Fig.22



Inventors:
Franz Neugebauer, Ludwig Wagenseil
by Paul Fischlund
Attorney

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. NEUGEBAUER ET AL
FREE PISTON MOTOR COMPRESSOR
Filed Nov. 12, 1941

Serial No
418,665
3 Sheets-Sheet 3

Fig. 10

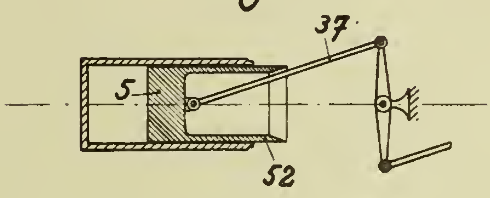
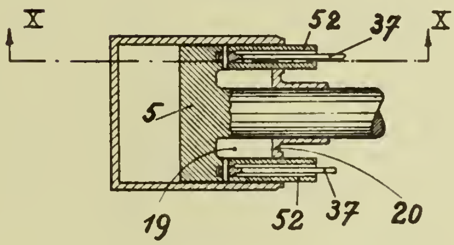


Fig. 11



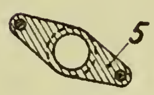


Fig. 17

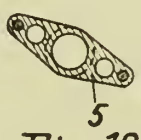


Fig. 18

Inventors:
Franz Neugebauer, Ludwig Wagenseil
by Paul Fechland
Attorney

Published May 11, 1943 | Serial No. 419,560

ALIEN PROPERTY CUSTODIAN

METHOD AND APPARATUS FOR CROPPING HOPS

Vladislav Sýkora, Neusattel, Germany; vested in the Alien Property Custodian

Application filed November 18, 1941

There is a class of utility plants, the blossoms or the stalks and other organs of which are separately utilized. Alternately, two or more parts of the plant are used after their mutual separation. The most important of such plants is the hop and therefore only the hop will be referred to hereinafter. In the case of hops, the pistillate cones or strobiles, hereinafter referred to as strobiles, are utilized. However, the stalks of the hop plant may equally be utilized, e. g. in the textile industry. The leaves may be used as cattle feed.

Hitherto, the hop harvest has been carried out either by hand-picking or mechanically. In the case of hand-working, the strobiles are, as far as possible, pluck singly, thus leaving a small piece of stalk on each strobile, as otherwise the strobile would easily decay on being dried. Such plucking requires a great deal of labour hands which, moreover, can be occupied only during the short harvest season. Hop picking as pure hand labour is therefore very expensive. Furthermore, this working method is largely dependent on the weather prevailing and in the case of long lasting rains the hop can not be cropped in due time thus being depreciated.

The chief drawback of the hitherto used hop cropping machines consists in scraping the hop. The comblike parts scrape the individual strobiles. The stalks are easily torn off close to the strobiles so that the above mentioned decaying occurs on drying, the hop flour laying between the individual leaves of the strobiles is strewn out and the crop thus deteriorated.

The present invention consists in a mechanical shearing of the hop and offers, in addition to a high yield, the further advantage that the very important short stalk pieces as above mentioned, are undamaged on the strobiles. The method and the devices required therefor, being the subject-matter of the present invention, will be described hereinafter. The hop parts shorn apart may, as will also be disclosed, be separated from each other in a clean manner by known means and may then easily be treated for further use.

In carrying this idea of the present invention into effect it is preferable to proceed in three stages. First, the twigs are shorn off the hop stocks, thereupon the strobile bunches are shorn apart so as to form individual strobiles. Alternatively two of the above mentioned working stages may be combined to one single step. The resulting waste refuse consisting of leaves and stalks is removed by well known means, such as shaking, sieving, blowing out or the like. The stalks shorn off the hop stocks may be cut to a suitable length by well known devices and then bound into bales. This treatment facilitates their further utilization. Should wire pieces be included in the resulting refuse which would be detrimental in cattle feeding, such wire pieces may be removed in a well known manner by magnets.

The accompanying drawings, on sheets **1** to **5**, Figs. 1 to 16 illustrate diagrammatically the method according to the present invention and, by way of example only, several embodiments of the devices for carrying such method into effect.

Figs. 1 and 2 illustrate in perspective the shearing process, Fig. 1 relating to the use of a ring-shear which will be described hereinafter, Fig. 2 to the use of comblike knives; Figs. 3 to 12 show diagrammatically several modifications of the three working stages of the method according to the present invention, Fig. 3 being a side view showing, partly in section, the separation of the hop twigs from the stocks with the use of the ring-shear, Fig. 4 a side view, partly in section, showing the separation of the strobile bunches from the twigs with the use of the ring-shear, Fig. 5 a corresponding plan view, Fig. 6 illustrating in a vertical section a somewhat modified proceeding in shearing the strobile bunches off the twigs with the use of a ring-shear, Fig. 7 a side view of a detail, Fig. 8 a side view of the ring-shear grate described hereinafter, for shearing apart the strobile bunches, Fig. 9 a corresponding plan view, Fig. 10 showing on an enlarged scale the vertical section of a detail thereof, Fig. 11 in a side view and section a modified proceeding in shearing the strobile bunches apart with the use of ring-shears, Fig. 12 being a cross section thereof, Fig. 13 a side view and section of a modification for effecting simultaneously two stages of the working process, i. e. shearing the strobile bunches off the twigs and shearing apart the strobile bunches by comblike knives, Fig. 14 a corresponding cross section. Figs. 15 and 16 show details, Fig. 15 being a portion of the developed cylinder projection of the ring-shear and Fig. 16 the view of a particular shape of the comblike knives. Referring to these illustrations, the method and apparatus according to the invention will now be described more fully.

Referring to Fig. 1. The telescopically arranged tubes **1** and **2** are provided with cutting prongs **3** and **4** on the one end. One of the tubes, in the figure the inner one, is fixed whilst the other, in the figure the outer one, is rotary. Both tubes may also be arranged so as to rotate

in opposite directions. This device will hereinafter be referred to as ring-shear. In 5 a plant organ, in the case illustrated a double-stalk of the hop stock, is introduced inside the ring-shear and drawn therethrough. The lateral plant organs, in the figure the twig 6 appear with their stalks between the cutting prongs and are shorn off. In Fig. 1, 7 indicates the fixed cutting prong acting in a straight manner, 8 the moved edge of the cutting prongs.

Referring to Fig. 2. The plant organs, in this figure at 9 a strobile, at 10 a strobile bunch, are shorn off by comblike knives 11 and 12. One of these knives, in the figure the knife 11, is fixed, whilst a reciprocated movement in lengthwise direction is imparted to the other knife, 12 in the figure, bearing against the fixed knife.

Referring to Fig. 3. At 13 the cut off hop stock is introduced inside a ring-shear 14 and drawn through rolls 15 and 16. The roll 15 is firmly supported and driven, the roll 16 is pressed onto the roll 15 by a lever 17 and spring 18 or the like. To facilitate seizing, the rolls may be provided with a surface fluting. Alternatively both rolls may be driven, the movement being transmitted from 15 to 16 in the simplest way by involute front wheels which are able to withstand the axial displacement occurring on the double-stalk of the hop stock being drawn through owing to its uneven thickness. For fostering the passage of the stalks and preventing their being squeezed in the case of an excessive thrust at one place only, two or even more pairs of drawing rolls may be provided. In the embodiment illustrated, the inner tube of the ring-shear is fixed, whilst the outer tube is subjected to a drive with a permanent turning direction. In this case, the drive is provided by cylindrical gears 19 and 20 and bevel gears 21 and 22 from the shaft 23 driving also the roll 15. By such combination of the ring-shear drive with the drive of the drawing rolls, the maintenance of a determined required ratio between the feed speed and the turning speed of the ring-shear may be obtained. A spring 24 which, under co-operation of an intermediate gliding ring 25 presses the outer tube of the ring-shear axially against the inner tube, enables the organs of the ring-shear to yield resiliently in the case of excessive resistances occurring.

Referring now to Figs. 4 and 5. The hop twigs fall on an endless belt 26 running over rollers 27 and 28, one of these rollers being driven and moving the belt in the direction indicated by the arrow. For fostering the twigs to be taken along therewith and for preventing them to move apart from each other, brushlike pins 29 are mounted on said belt. Two sidewise arranged endless chains 30 and 31 provided in a horizontal plane and being oblique relatively to the longitudinal direction are acting to press the hop twigs together and to introduce the stalks therof into a ring-shear 32. The chain 30 is laid over sprockets 33 and 34, the chain 31 over the sprockets 35 and 36. The sprockets 34 and 35 are coupled through front gears 37 and 38 and are driven. Individual chain links are provided with forks 39 the ends of which being rounded off to prevent the strobiles being stung through. Owing to the above mentioned coupling of the sprockets 34 and 35 any picking together of the forks is avoided on the twigs being pressed together. The forks seize the twigs which are conveyed along therewith and press their stalks together so as to introduce the latter into the ring-shear in the required position. In Fig. 4, for the sake of clearness, none of the chains is shown completely, but one chain link provided with a fork 39 being shown. The ring-shear with drawing rollers, drive, etc. is arranged in an analogous manner as described with reference to Fig. 3, only the cutting prongs being thinner and more closely together to avoid the strobiles being cut through. The strobiles and leaves shorn off fall laterally away.

Referring to Figs. 6 and 7. This modified embodiment of shearing off the strobile bunches consists in that the hop twigs arrive at the ring-shear 41 through a funnel 40. To prevent the funnel being choked by the twigs and to foster their feeding movement, an endless chain 44 laid over sprockets 42 and 43 extends with the one branch through the funnel and ring-shear axis and is provided with lateral spherically lugs 45 having the function of taking the twigs along therewith. One of said sprockets is driven. Such chains for facilitating the forward movement of the twigs may likewise be arranged sidewise on the funnel, as is illustrated in 46. In this case, the lugs 47 are set on individual chain links and may be of a greater length than in the above mentioned arrangement, since they have not to pass through the ring-shear. Alternatively, it is possible to provide both the axially extending and the lateral chains. The necessary pressing together the stalks of the hop twigs is operated in such case either as indicated in the Figs. 4 and 5 or by means of crank-driven forks 48 and 49 placed opposite each other in a similar arrangement as the chain forks 39. Owing to their obliquity, these forks exert, in addition to pressing the twigs together, a progressive movement with the twigs. In order to ensure a correct co-operation of the forks, the crank drives thereof are coupled together. The ring-shear 41 has thin cutting prongs to prevent the strobiles being cut through. The strobiles and leaves shorn off fall laterally away. The stalks may moreover be seized by rollers 50 and 51 of the kind referred to above for fostering the drawing through of the twigs.

Referring to Figs. 8–10. A number of ring-shears 52 are combined together in a ring-shear grate. Fig. 10 shows such a ring-shear on an enlarged scale. In this case the outer tube 53 is fixed whilst the inner tube 54 is rotating. The cutting prongs are thin thus preventing the strobiles being cut through. The fixed tubes of all ring-shears of the grate are inserted in a plate 55 of the ring-shear grate 56. The inner tubes are inserted within the fixed outer ones, so as to be easily rotatable and are moreover supported in a plate 57 of the ring-shear grate 56. Said inner tubes, by gravity, abut by a projection against a shoulder of the fixed tubes, thus being able to yield resiliently in the case of additional resistances to be met. The ring-shear grate is suspended on bars 58, and for fostering the feed of the strobile bunches strewn thereupon through a hopper 59, a reciprocating movement is imparted thereon by a crank gear 60. This shaking movement may likewise be utilized for the drive of the rotatable inner tubes of the ring-shears. To this effect, racks 61 attached to the fixed frame of the device are brought into mesh with a gearing 62 provided on the rotary tubes of the ring-shears. In such manner said ring-shears are exerting, on the ring-shear grate being shaked, an alternating rotation, the strobile bunches arriving on the ring-shears being thus

shorn apart and the individual strobiles thus formed falling out through the inner space of the ring-shears. To avoid the clearance between the ring-shears to be choked and to hamper the cutting operation to be carried out on the strobile bunches, gliding members 63 are arranged in said clearances, said members being topwise spherically limited and exerting a reciprocating movement parallel to the ring-shear axis. This movement may likewise derive from the shaking movement of the ring-shear grate 56. To this effect, rodlike extensions 64 of the gliding members 53 are firmly inserted in cross bars 65 exerting the necessary swinging motion on the ring-shear grate being shaken in such a manner, that endwise wedgelike projections 66 abut against fixed pulleys 67 onto which they will be pressed by pulleys 68 under the influence of thrust springs 69 or like elements. The cross bars 65 are guided within the ring-shear grate 56 by lateral lugs 70 thus taking part in its shaking movement and moving only up and down in vertical slots 71. Thus the strobile and other plant organs shorn are thrown from the clearances between the ring-shears into the inner space of the latter and discharged. In Fig. 9 the two top rows of ring-shears are illustrated in section above the gearing 62 whilst the two bottom rows are shown in a top view. Therefore, the upper half of this figure discloses the bottom plate 57 and the racks 61 whilst the lower half shows the top plate 55 and the cross bars 65. To prevent the strobile bunches strewn on the ring-shear grate to accumulate, a coarse screen may be provided on top the hopper 59 to ensure a correct spreading ing the strobile bunches.

The shearing operation may be enhanced by pressing the strobile bunches onto the ring-shears by the action of rods provided in the upwardly extending axis of the ring-shears and guided and driven in such a manner that they take part in the shaking movement of the ring-shear grate 56 and another swinging movement is imparted thereto in the direction of the axis mentioned above. The same effect may be achieved by a pneumatic pressure from above or by sucking from below. In such case the ring-shear grate must be sealed against the carrying structure.

Referring to Figs. 11 and 12. In this case ring-shears 72 are arranged in rows on the circumference of a rotating drum 73. The drum is supported in the usual manner endwise in rollers 74. The axial thrust of the drum is taken up by pulleys 75 arranged on the one end. Both the rollers and the pulleys on one end are arranged in carrier rings 76. To enable the inclination of the drum to be adjusted, said carrier rings may be supported in the machine frame by lateral pivots 77 the supporting arrangement for the one carrier ring being slidable. The ring-shears are arranged in a similar manner as described with reference to the previous modified embodiment. The alternating rotating movement of the inner tubes is derived from the drum rotation. To this effect, one of the carrier rings is provided laterally with a corrugated lug 78 against which pulleys 79 provided on levers 80 are pressed by tie-rods 81 and springs 82. The levers 80 are supported on the drum circumference, the springs abut against the articulated bearing arrangement 83 of the tie-rods 81. Racks 84 being in mesh with a gearing 85 of the inner tubes of the ring-shears are linked at 86 to the levers 80, at the other end in 87 to the levers 88 supported likewise on the drum circumference. On the drum being rotated, the levers 80 exert a swinging movement and the racks 84 swinging therewith impart an alternating rotating movement to the inner tubes of the ring-shears. The drum rotation is effected through a gearing 89 provided at the one end thereof. In the case of adjustable drum inclination the drive will be preferably led over one of the carrier ring pivots 77. The gearing 89 is in mesh with a front gear 90 connected fixedly to a bevel gear 91 being in mesh with another bevel gear 92 being in turn fixedly connected to the front gear 93 taking up the outward drive. The gears 92 and 93 are supported at one of the carrier pivots 77.

Through a funnel 94 the strobile bunches are led inside the drum to roll down the ring-shears thus being shorn into individual strobiles. The strobiles and other parts shorn off are discharged either through the inner space of the ring-shears or through sievelike holes 95 provided in the drum jacket between the ring-shear rows.

Referring to Figures 14 and 13. With this arrangement shearing the strobile bunches from the twigs and shearing the bunches into individual strobiles, i. e. two of the steps of the whole working process may be combined in a single step. A rotating drum 96 of eventually adjustable inclination is carried, similarly as in the previous case, in carrier rings 97 and driven by gears. Inside a series of comblike double-shearing shears 98 acting like those described with reference to Fig. 2 are arranged, the pitch of said shears being such as to enable them to cut through the stalks but not the strobiles. The fixed shearing combs are fixed on carrier rods 100 by means of bearing members 99, said rods being pivoted in shields 101 fixed inside on the drum circumference. On these fixed combs the moving shearing combs are abutting, being guided in bearing bodies 99 and reciprocated by driving cams 102. These cams are fixed on rods 103 supported in the bearing bodies 99 and operated through links 104 from levers 105. These levers are supported on the drum circumference and provided on the one end with pulleys 106 which are pressed against the corrugated lateral lug 108 of one of the carrier rings 97 through the action of springs 107 mounted on the rods 103 and abutting against the shields 101 at the one drum end. In this manner the necessary reciprocating movement of the shearing combs is derived from the drum rotation. The comblike shearing knives are inclined under a suitable angle relatively to the drum radius and project inwardly to a suitable height, eventually some of them more and others less so as to seize all the strobiles sitting on the twigs in various positions.

Through a funnel 109 the hop twigs are introduced into the drum and roll down the shearing combs on the drum being rotated, this leading to a progressing shearing off the strobile bunches which in turn are shorn into individual strobiles. The latter falls through sievelike holes 110 provided in the drum jacket. The stalks and large leaves are discharged through the bottom space of the drum. Alternatively, series of ring-shears such as 72 in Fig. 11 may be arranged at the drum circumference between the comblike shearing knives 98 of this device, the strobile bunches being shorn from the hop twigs fed into the drum by the comblike shearing knives whilst the shearing of the strobile bunches into individual strobiles is enhanced by the ring-shears.

Referring to Fig. 15. In their pronged portion, the tubes of the ring-shears may be conically or cylindrically arranged, any axial thrust having to be taken up by suitable shoulders.

In a conical arrangement with the apex of the cone being directed against the passage direction as in Fig. 1 the device causes the parts to be shorn to be drawn apart in the required manner, thus loosening the material to be drawn through.

The drawing through is further facilitated in making the diameter of the inner ring-shear tube close behind the cutting prongs somewhat larger than in the region of the cutting prongs, as is shown in Fig. 3, so that a widening of the cross section is attained in the direction of the passage.

In the case of ring-shears, the rotating part of which turns only in one direction, the cutting edges of the prongs are to be arranged in axial planes thus avoiding any counterpressure occuring otherwise on inclined cutting edges.

The most favourable cutting conditions are attained in the arrangement shown in Fig. 15 showing a developed cylinder surface whereon the cutting prongs have been radially projected. The mobile cutting prongs are hatched in this figure. The following principles must be observed.

The ratio between the passage speed in an axial direction and the rotating speed in a tangential direction is firstly to be chosen in such manner that the tangential speed is larger than the tangential component in the opposite direction and which may be calculated, presuming also the rotatable tube of this ring-shear to be motionless and supposing the stalk to be cut while gliding on the oblique non-cutting and therefore blunt flank **111** of the actually rotatable tube, and determining the respective tangential component as an effect of the axial speed. Thus, during the movement, the blunt flank glides off the stalk to be cut always faster than any accumulation of the stalks could occur between the blunt edge considered of the moved tube and the respective edge **112** of the fixed tube. Thus, with this arrangement, only the axially extending sharp cutting flanks of both knives **113** and **114** are effective.

The width and depth of the clearance between the cutting prongs of both tubes are to be chosen in such manner that even with a most unfavourable incidence of the stalks to be cut, these latter are always cut through yet before they would be able to get to the bottom of the clearance.

It is to be understood that, on the inlet, the gap must be larger than the largest occurring diameter of the stalks. Further there are to be investigated the two limit cases of the various possibilities of the stalks arriving at the gap and the conditions are to be in conformity with the results. One of those limit cases is the arrival of the stalk alongside the fixed cutting edge **114**, the other the arrival alongside the fixed oblique and blunt edge **112**. Both these limit cases are illustrated in Fig. 15. In the former case the maximum occurring stalk diameter **115**, in the latter case the minimum occurring diameter **116** must be taken into account.

In both cases, the most unfavourable case must be presumed, viz. the stalk arriving in the inlet just on the blunt point of a cutting prong of a rotatable tube, so that the next following cutting flank concerned requires the longest imaginable time for attaining, and cutting through, the stalk under treatment.

Thus, the absolute value of the passage speed is without any influence on the correct cutting operation. Only its correct ratio relatively to the rotating speed in the sense explained above is decisive.

This independence on the passage speed enables very high cutting outputs to be attained.

Referring to Fig. 16. To prevent stalks introduced between the shearing combs to fall out, the cutting prongs of both shearing knives i. e. the fixed and the reciprocating ones, are arranged according to Fig. 16. The moved cutting prongs are hatched. The fixed cutting flanks are tapered thus acting as a kind of barbed hook.

It is to be understood that all the driving devices have been designed and shown in the figures merely by way of example and may obviously be replaced by other known devices acting to the same effect, e. g. the racks by chains, etc.

The transport between the individual parts of the apparatus is carried out by known means, such as conveyors, bucket-elevators, pneumatically and the like. The whole plant may be driven by a motor of any kind. This motor may also be used for propelling the carriage whereon the apparatus is to be transported.

Since the above disclosed method allows of shearing off all strobiles from the top stocks and as on removing the refuse only those strobiles which are too small to be utilized are eliminated, such cropped strobiles include also those of inferior quality which may be recognized on their brownish colour unlike the green or yellow-green strobiles being of high grade quality.

This unsuitable strobiles may be eliminated by hand-picking e. g. on a belt whereon the strobiles are conveyed or automatically in a known manner by using photocells.

The three working stages above described may be united in a single machine mounted eventually on a carriage to be preferably portable or may be preferably be carried into effect on two machines, one of which being arranged for shearing the hop stocks and twigs, the other for shearing the strobile bunches into individual strobiles and for separating the strobiles from the refuse material. Such division has the advantage, that the first machine can be smaller and lower so as to move easier through the hop yard thus facilitating the hop stocks to be approached. The other machine may be erected close to the hop drier. The mixture of strobile bunches and waste delivered by the first machine can be brought to the other machine in the well known hop carts.

It is also possible to design the plant in such manner that the mixture from several machines is conveyed to a common machine for shearing through and separating the waste.

VLADISLAV SÝKORA.

PUBLISHED V. SYKORA **Serial No.**

MAY 11, 1943. METHOD AND APPARATUS FOR CROPPING HOPS **419,560**

BY A. P. C. Filed Nov. 18, 1941 5 Sheets-Sheet 1

Fig. 1.

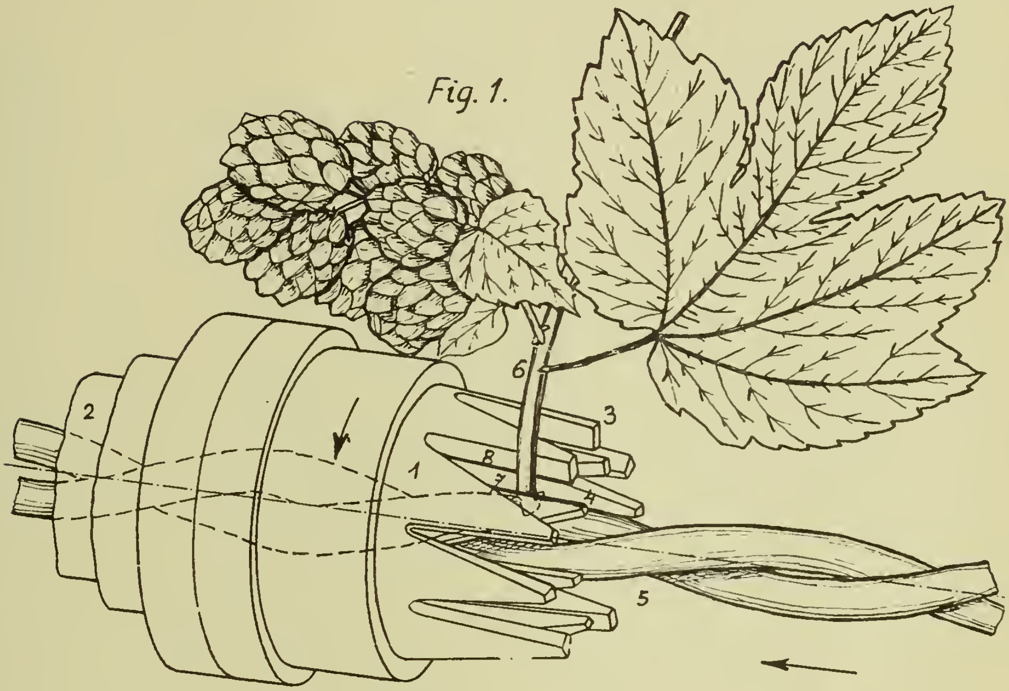
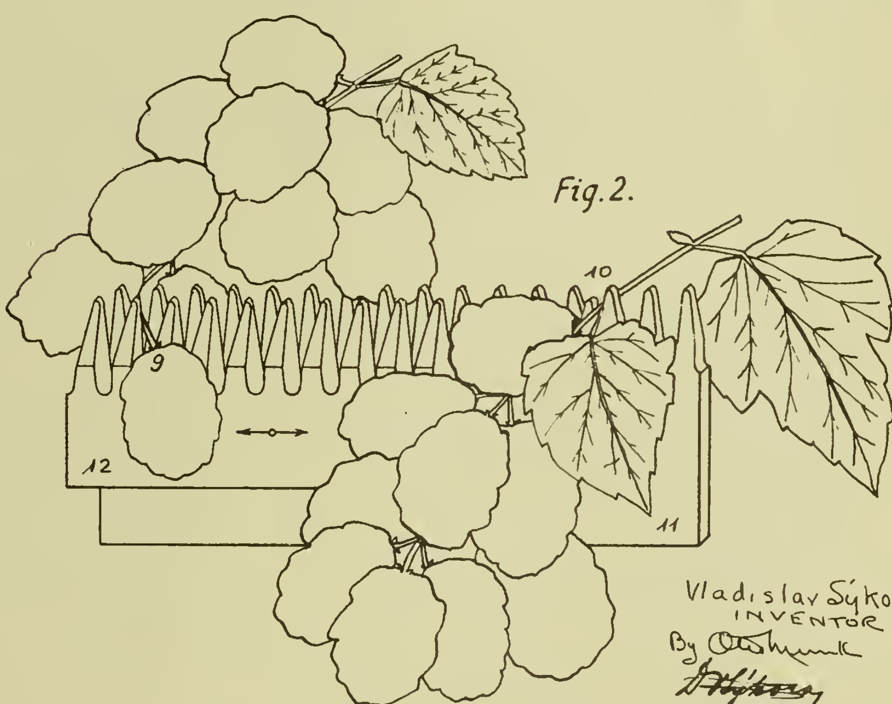


Fig. 2.



Vladislav Sýkora
INVENTOR
By Otto Munk
~~D Sýkora~~
his ATT'Y.

PUBLISHED	V. SYKORA	Serial No.
MAY 11, 1943.	METHOD AND APPARATUS FOR CROPPING HOPS	419,560
BY A. P. C.	Filed Nov. 18, 1941	5 Sheets-Sheet 2

Fig. 3.

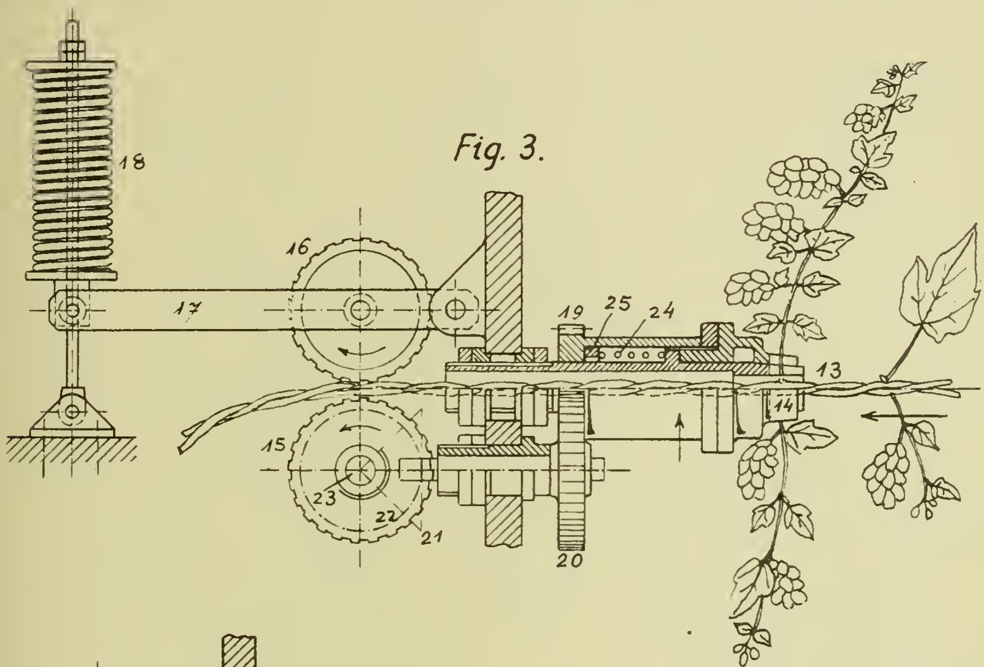


Fig. 4.

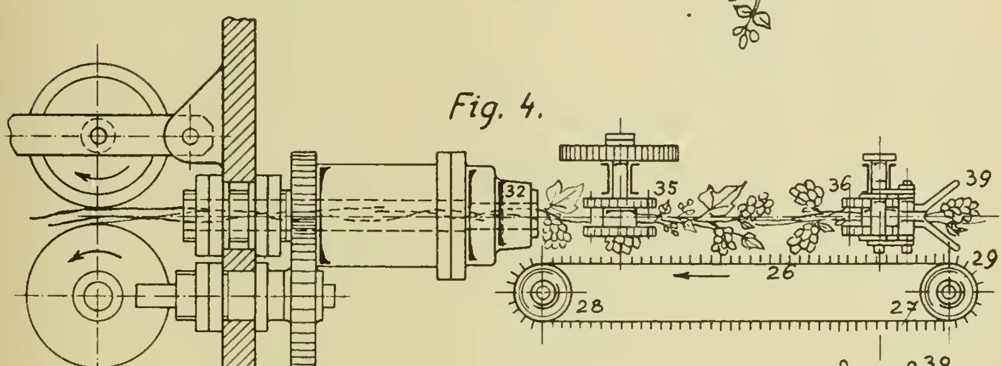
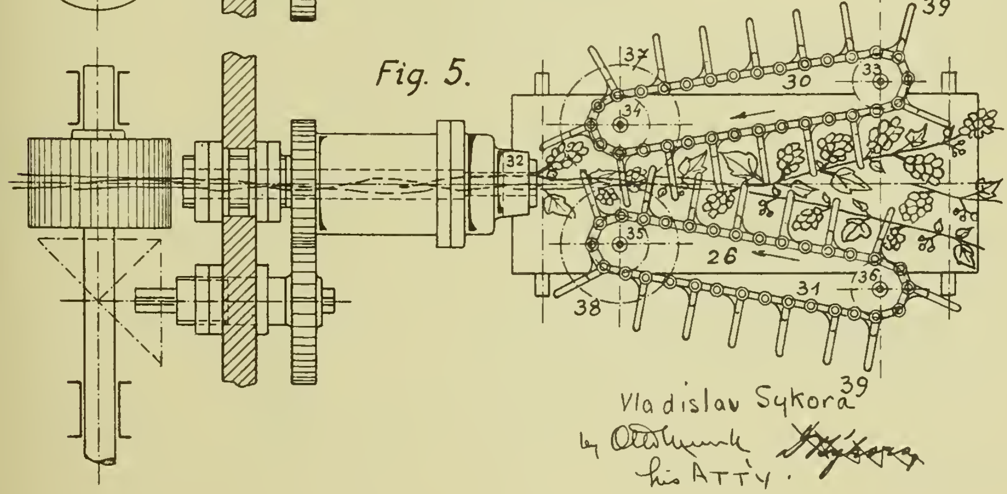


Fig. 5.

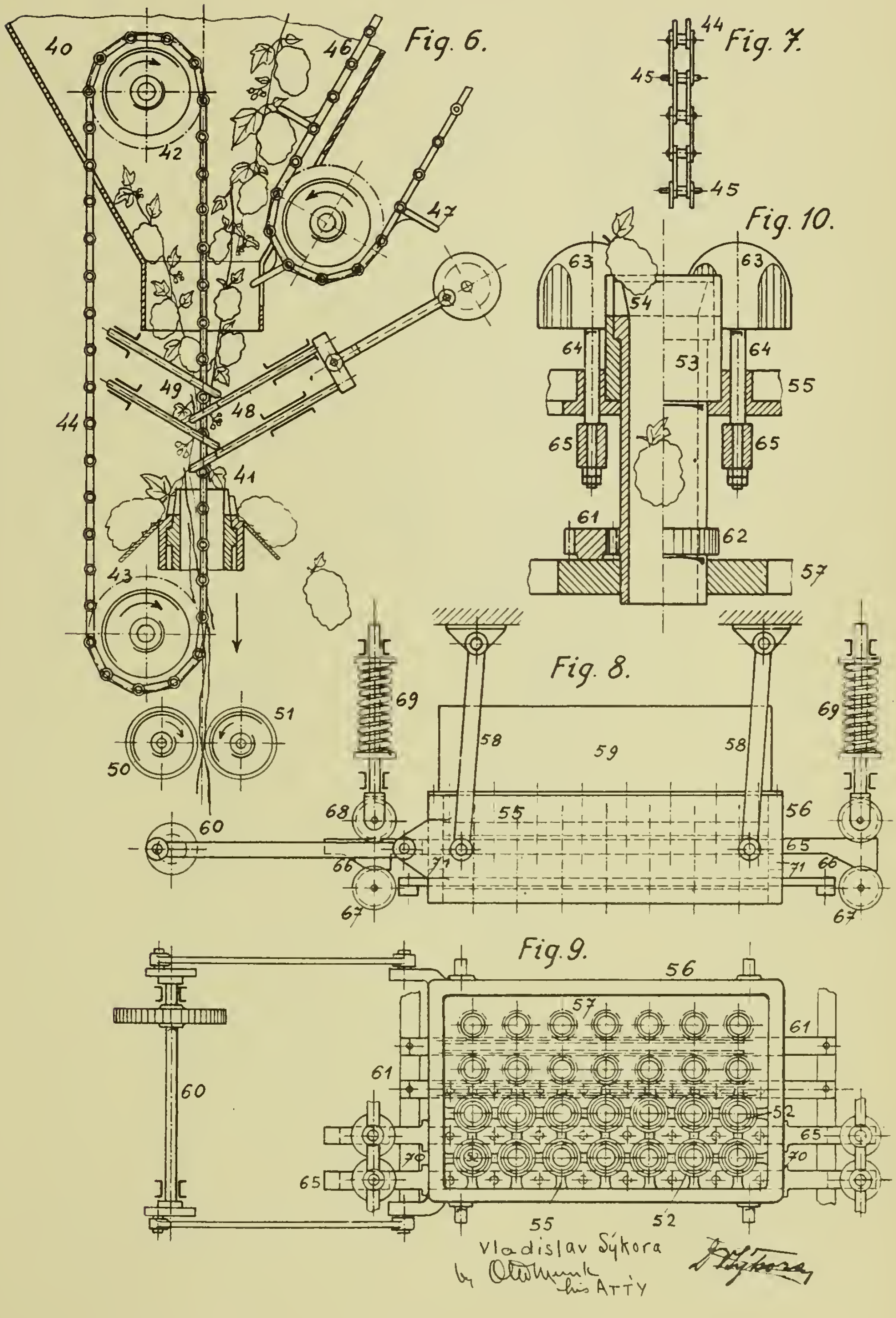


Vladislav Sykora
by Otto Munk
his Att'y.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

V. SYKORA
METHOD AND APPARATUS FOR CROPPING HOPS
Filed Nov. 18, 1941

Serial No.
419,560
5 Sheets-Sheet 3



PUBLISHED
MAY 11, 1943.
BY A. P. C.

V. SYKORA
METHOD AND APPARATUS FOR CROPPING HOPS
Filed Nov. 18, 1941

Serial No.
419,560
5 Sheets-Sheet 4

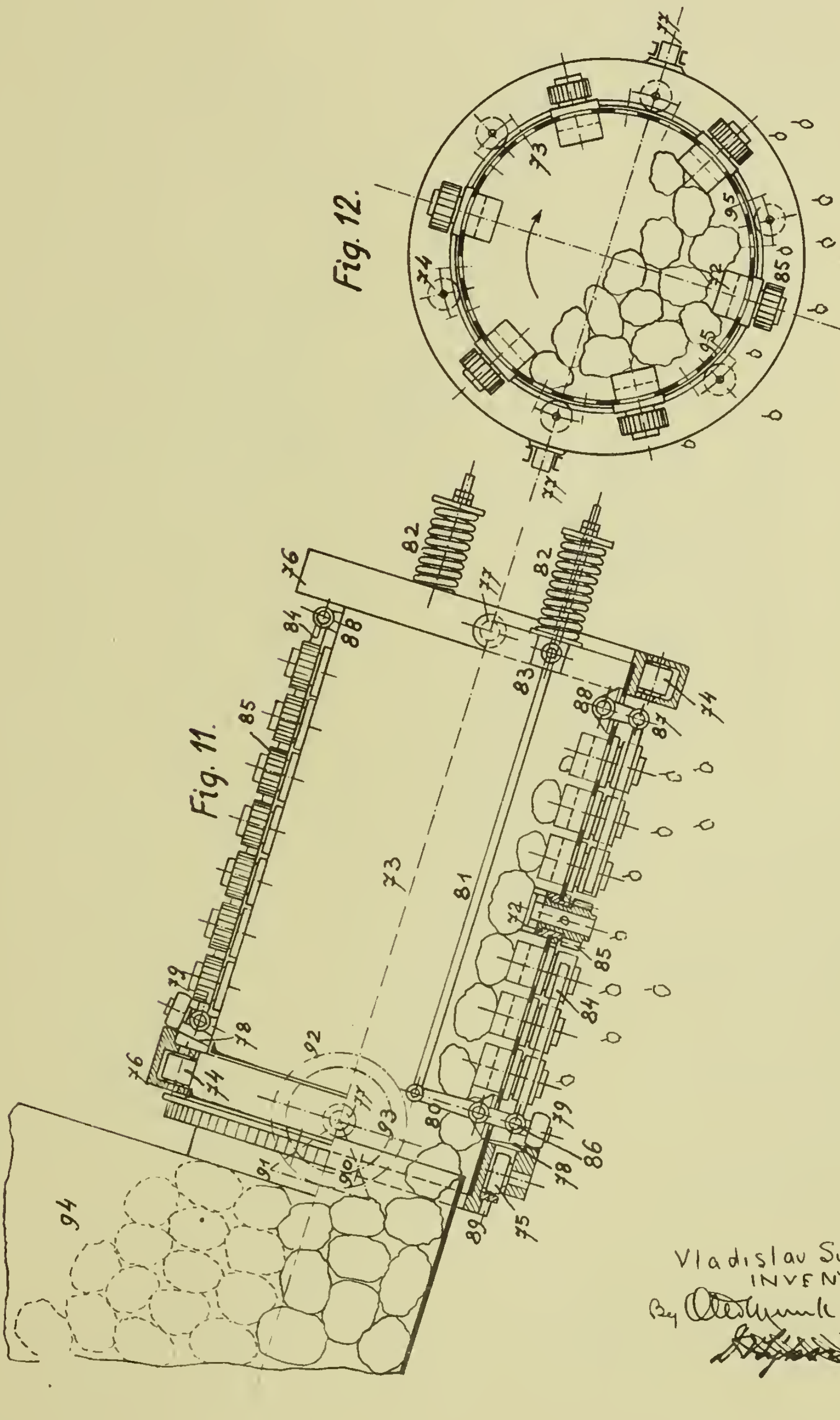
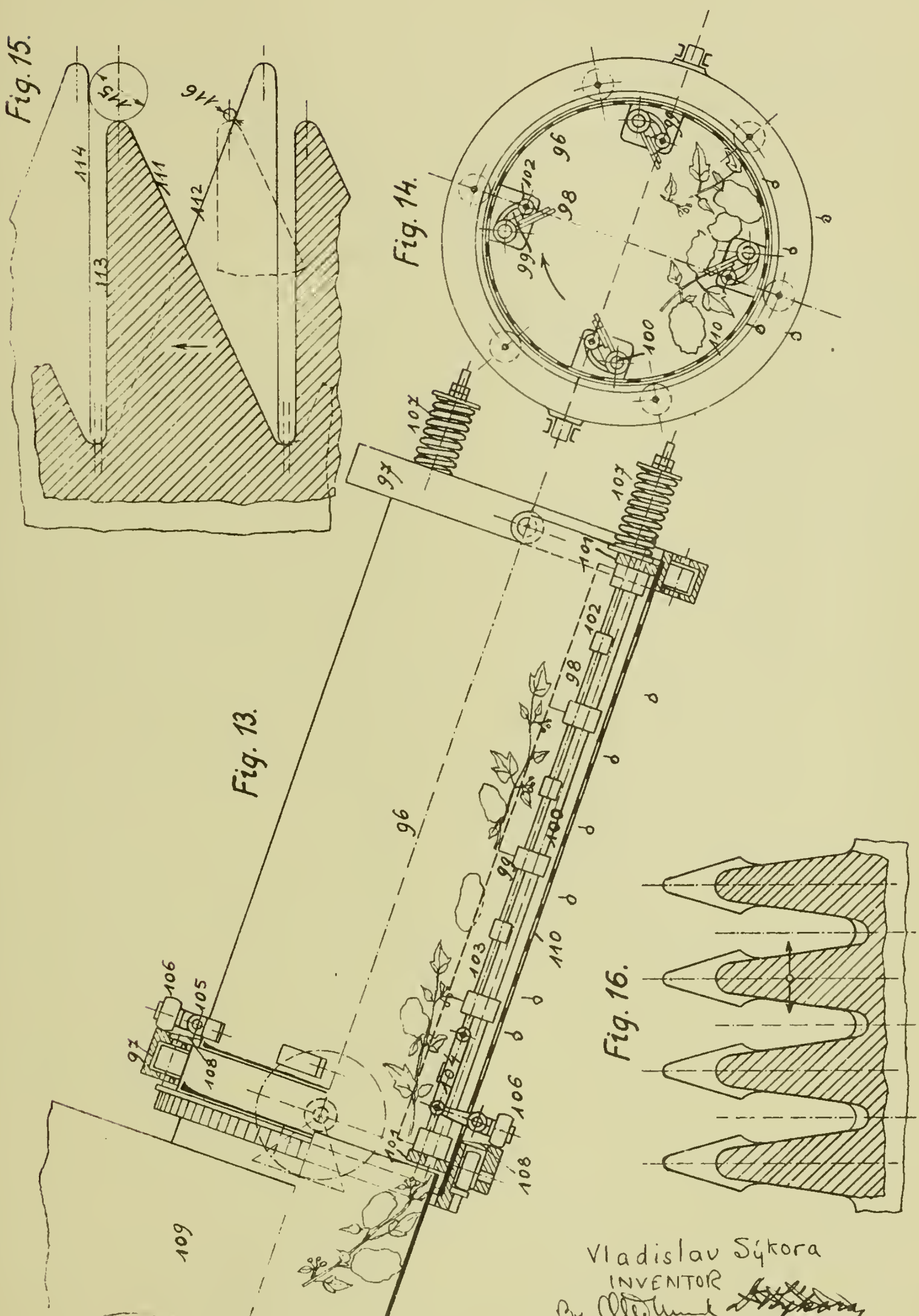


Fig. 12.

Fig. 11.

Vladislav Sykora
INVENTOR
By [illegible] his ATTY

PUBLISHED | V. SYKORA | Serial No.
MAY 11, 1943. | METHOD AND APPARATUS FOR CROPPING HOPS | 419,560
BY A. P. C. | Filed Nov. 18, 1941 | 5 Sheets-Sheet 5



Vladislav Sýkora
INVENTOR
By [illegible]
his ATT'Y

Published May 11, 1943 Serial No. 421,060

ALIEN PROPERTY CUSTODIAN

METHOD AND DEVICE FOR REGULATING THE RATIO OF MIXTURE OF GASES

Emil Schimanek, Budapest, Hungary; vested in the Alien Property Custodian

Application filed November 29, 1941

The invention relates to methods and devices for regulating or controlling the ratio of mixture of two or more gases and consists in essence in making the pressures of the gases to be mixed automatically dependent on each other or on a comparison pressure.

In practice it often occurs that the ratio of mixture has to be regulated in such a manner that the ratio of mixture remains constant or is adjusted according to certain requirements. Up to now the ratio of mixture of gases was regulated always by modifying or adjusting the outlet cross section. It is well-known, however, that the volume of a gas flowing through an aperture depends on the cross section of the aperture as well as on the pressure gradient. Therefore, if the pressures of the gases change before the point of mixture, a regulation by adjusting the cross section becomes unreliable and even often unserviceable. This drawback is overcome by the invention by way of making the pressures of the gases before mixing dependent on each other so that the pressure gradient of the gases is involved in this method or used therefor, respectively.

The invention is especially suitable in connection with the operation of internal combustion engines working with a mixture of gases as for instance blast furnace gas, waste gas, lighting gas etc. with air, and particularly for internal combustion engines with a gas generator. For, with internal combustion engines it is of great importance for maintaining a high output that the required ratio of mixture of gas and air is maintained exactly. Especially with engines supplied from gas generators the regulation accordance to the invention is of great importance because, in view of the varying resistance to flow through the generator, gas purifier etc., the pressure of the generator gas varies considerably before the mixing chamber, these variations being dangerous to the working of the motor or impairing the output of the motor.

If, for instance, during prolonged working or with an inferior fuel the gas purifier is choked up whereby the resistance to flow is increased, the motor sucks in too much air in proportion to the gas whereby under certain conditions the mixture can become even inexplosive. Especially for internal combustion engines, therefore, the invention may be used to regulate the ratio of gas and air in accordance with the requirements so that a good output of the motor is warranted under all conditions of use.

According to the invention the regulation can be effected in such a manner that the pressures of the gases to be mixed will be balanced automatically against each other and the ratio of mixture determined by the cross section of the outflow, this cross section in case of need being adjustable. The pressures of the gases to be mixed may be regulated automatically in a direct manner so that the ratio of volumes of the gases flowing towards the mixing point will be determined by the ratio of the pressure gradients feeding the gases. Therefore, the pressure of a gas can be used for regulating the pressure of the other gases to be mixed whereby all pressures can be kept constant or the ratio between the gas pressures adjusted as desired.

If the volumes of the gases to be mixed are equal, the pressures of these gases can be regulated in such a manner that the same are equal or balanced, whereby the gases flow through apertures having equal cross sections. If, however, the volumes of the gases to be mixed are unequal, this proportion can be taken into account by the size of the outflow openings or by adjusting ratio of pressures or by both methods. In any case, however, according to the invention the pressure of the gases before mixing must be involved in the regulation. According to the invention, the ratio of mixture may also be varied in accordance with the requirements for instance by varying the ratio of the pressures of the gases to be mixed or the ratio of the pressure gradients feeding the gases in a predetermined manner. This may be effected by balancing the pressures of the gases to be mixed in such a manner that the ratio of mixture for instance in case of differing gas consumption or different heights of pressure will be changed by the influence of an additional power which takes part in the resulting balance conditions. Such a method of regulation corresponds to the requirement that with internal combustion engines the mixture should contain more gas with less number of revolutions and with the running light. Likewise, if the quality of the generator gas grows worse with decreasing gas consumption this circumstance is taken into consideration.

The variation of the volume of the mixture in accordance with the differing quantity of mixture required can be effected according to the invention in such a manner that only the pressure of one of the gases is varied by throttling arbitrarily while the pressure of the other gases is adjusted automatically in dependency of the pressure which is varied arbitrarily.

In adjusting the ratio of mixture also changes

in the composition of one or more gases of the mixture can be taken into account in such a manner that one of the gases becoming worse, the volume of this gas will be increased automatically if compared with the volume of the other gases to be mixed. Such a change can take place by a variation of the temperature or quality (calorific power) of the gas. Therefore, according to the invention the ratio of mixture can be varied automatically in accordance with the changes occurring with one or more of the gases to be mixed.

Especially in the use of generator gas for internal combustion engines the drawback occurs that the calorific power of the generation gas varies considerably with the load or the gas consumption, respectively. This drawback has the effect that the motor receives a mixture varying under different loads even if the same ratio of mixture is maintained. If the calorific power of the generator gas decreases too much, under certain circumstances the mixture becomes so bad that the working of the motor, will be in danger. On the other hand the gas cannot be fully utilized with the consumption of gas corresponding to best calorific power if the ratio of mixture of air and gas is adjusted corresponding to an average value of the gas quality. In any event the degree of efficiency of the plant decreases.

The invention also serves the purpose to avoid this drawback, by taking into account that the temperature of the gas leaving the generator is a measure for calorific power of the gas. The less the temperature of the outflowing gas, the higher is the calorific power because the rate of efficiency of the generator is higher in this case. The higher the temperature of the gas, however, the less is the calorific power because the higher gas temperature involves a higher content of carbon dioxide and a smaller content of hydrogen. Therefore, according to the invention the ratio of mixture of generator gas and air is adjusted in correspondence with the quality of the generator gas by a device operating in dependency of the temperature of the gas leaving the generator in such a manner that with an increase of the temperature effected by a decrease of the calorific power the volume of the gas is increased and/or the volume of the air is decreased, and vice versa.

Therefore, the invention permits of keeping the heat capacity constant, the requirement of varying the heat capacity of the mixture with different loads or number of revolutions, respectively, of the motor being taken into account. Therefore, the invention is of great advantage especially with internal combustion engines supplied with gas from gas generators.

A device for carrying out the method according to the invention in essence comprises an apparatus having pressure-sensitive means for instance diaphragms, pistons or the like, the pressures of the gases to be mixed or the comparison pressure acting upon such means, these means being connected with the mechanisms controlling the gas supply, the regulating pressure acting on one side of these diaphragms or the like and the pressure to be regulated acting on the other side. If more than two gases are mixed, the pressure of each gas will be balanced against the pressure of the arbitrarily regulated gas by means of a separate diaphragm. The supply of the gases may take place directly through the regulating device.

According to the invention the adjustment of the ratio of mixture in accordance with the temperature or the quality of the gas can be effected for instance by the action of a temperature-sensitive device on a spring or the like acting upon the pressure-sensitive device (diaphragm or the like) or by way of a variation or throttling, respectively, of the outflow cross section or sections.

In the drawings different forms of execution of a device according to the invention are shown in a diagrammatic manner. Figs. 1 and 4 show different devices for the regulation of the ratio of mixture of two gases whilst Figs. 2 and 3 show devices for regulating the ratio of mixture for three and five gases, respectively. Figs. 5 and 6 illustrate two forms of execution relating to a plant comprising a gas motor and a gas generator. Figs. 7 relates to an embodiment of the invention in which the ratio of mixture is regulated in dependency of the temperature or the calorific power, respectively, of a gas.

Fig. 1 shows an embodiment of the invention for the regulation of the ratio of mixture formed by two gases, for instance air and fuel gas. One of the two gases, for instance air flows in through the pipe 5 in the direction of the arrow into the chamber 9 which is connected with the chamber 3 by a valve 8. From this chamber 3 the air flows through the pipe 10 into the mixing chamber 11. The chamber 3 is separated from the chamber 2 by a diaphragm 1 which serves for regulating the pressures. The fuel gas enters into the chamber 2 through the pipe 4 and flows through the pipe 7 into the mixing chamber 11 from which the mixture of gas and air flows to the motor cylinder through the pipe 12.

By the valve 8 controlled by the diaphragm 1 the same pressure is maintained in the two pipes 7 and 10 leading into the mixing chamber, and the chambers 2 and 3. The regulation takes place in the following manner: If the air pressure in the chamber 3 is higher than the gas pressure in the chamber 2, the diaphragm 1 moves to the left and closes the valve 8 so that the air pressure in the chamber 3 decreases until the diaphragm 1 shifts the valve 8 in such a position that the pressures in the chamber 2 and 3 become equal. Advantageously, a cataract 13 is arranged in order to damp the movement of the valve 8, the damping being dependent on the tightness of the sealing of the damping piston 13 on the cross section of an opening (not shown in the drawing).

Fig. 2 shows an embodiment of a device for regulating a mixture of three gases e. g. a mixture of air with two different gases for instance generator gas and lighting gas. The air enters the chamber 9 through a pipe 5 and flows through the valve 8 into the chamber 3 which is separated from the chamber 2 by diaphragm 1. From chamber 3 the air flows into the mixing chamber 11 through the pipe 10. The generator gas enters the chamber 2 through the pipe 4 and flows through the pipe 7 into the mixing chamber 11. The lighting gas enters the chamber 15 through the pipe 14 and flows into the chamber 17 through the valve 16, the chamber being separated from the chamber 2 by the diaphragm 18. The lighting gas flows through the pipe 19 into the mixing chamber 11. The operation of this device is the same as with a device shown in Fig. 1 with the difference that the device shown in Fig. 2 is double acting and the pressure of the generator gas in the chamber 2 controls not only the air pressure in chamber 3 but also the lighting gas pressure in chamber 17, the valve 16 regulating

the pressure in chamber 17 under the influence of diaphragm 18 in such a way that this pressure is equal to the pressure in chamber 2. Therefore, in the chambers 2, 3 and 17 the pressure is the same.

The walls of chamber 2 may consist of several diaphragms so that a mixture composed of any desired number of gas components can be regulated.

Fig. 3 shows an embodiment of the invention for the regulation of a mixture of five gases. For instance, the regulating gas may be generator gas and the regulated gases may be air, lighting gas, blast furnace gas and water gas (hydrogen).

Regulation takes place by the pressure in the chamber 2. The regulating gas flows into the chamber 2 through the pipe 4 and from this chamber through the pipe 7 into the mixing chamber 11. The regulated gases flow through the pipes 25, 26, 27 and 28, respectively, and the valves 33, 34, 35 and 36, respectively, into the chambers 21, 22, 23 and 24, respectively. The valves are controlled by the diaphragms 29, 30, 31 and 32, respectively, in the same manner as described with regard to Fig. 1 so that the pressure in all the chambers 2, 21, 22, 23 and 24, respectively, will be equal. Therefore, the gases flow through the pipes 7, 40, 41, 42 and 43, respectively, under equal pressure into the mixing chamber 11.

In order to enable quick regulation with small movements of the diaphragms the regulating pressure can be regulated itself. Fig. 4 shows an embodiment of such a device. According to this embodiment two valves 8 and 20 are connected with the diaphragm 1 in such a manner that these valves are operated by the diaphragm in opposite directions. Therefore, also the gas flowing in through the pipe 4 first enters the chamber 44 from which it flows regulated by a valve 20 into the chamber 2 and then through the pipe 7 into the mixing chamber 11. In this manner the pressures in the chambers 2 and 3 are balanced much more rapidly because when the diaphragm moves to the right, valve 8 opens and valve 20 closes while in the opposite direction to the left valve 8 closes and valve 20 is opened at the same time. This opposite movement lasts until the pressures are balanced.

The pressure-sensitive means for effecting the regulation are shown in the drawing as diaphragms. However, also, other means as for instance pistons or the like may be used.

In the embodiments shown in the drawing the regulation effects equality of the pressures. If equal volumes of gases are to be mixed, the cross sections of the openings leading to the mixing chamber are equal. If unequal gas volumes are to be mixed, this can be effected by choosing different cross sections of these openings, and the same could be made adjustable at will. However, the arrangement could be made also in such a manner that the pressures of the gases would be maintained unequal so that already by the ratio of the pressures the ratio of mixture would be determined.

The arrangement could be made also in such a manner that the pressure of one of the gases will be kept equal to the sum of the pressures of a plurality of gases so that the pressure of the other gas or the other gases will be increased automatically if one or more gases are failing. This for instance will occur when the available gas volume is temporarily insufficient and equilibrium shall be obtained by a gas used auxiliarily. This may, for instance, occur with internal combustion engines fed by generators if at the start the generation of gas is not sufficient. In such a case the invention enables in a simple manner additional use of a gas for instance fed by gas bottles.

Furthermore, the invention permits variation of the composition of the mixture in a predetermined manner. For instance, this is necessary with a gas motor in which with small loads and low numbers of revolutions of the motor a mixture more rich in gas is advantageous if compared with full loads and high number of revolutions. This can be obtained by the invention for instance by loading the diaphragm 1 (Fig. 1) by a compression spring arranged in chamber 3. In this case the diaphragm 1 will be in equilibrium only when the gas pressure in chamber 2 becomes equal to the sum of the spring pressure and the air pressure in chamber 3. Therefore, the air pressure in chamber 3 always is smaller than the gas pressure in chamber 2 in accordance with the spring pressure, and this of course has the more effect with smaller loads i. e. with less absolute pressure. This has the consequence that with smaller loads less air flows into the mixing chamber. The desired variation of the composition of the mixture can be obtained by corresponding spring pressures whereby the suction pipe pressures and the pressures in the mixing chamber occurring during running without load and under full load will be taken into consideration.

Such an embodiment of the invention has special advantages for plants comprising gas generators and gas motors. Figs. 5 and 6 show diagrammatically the arrangement of such a machine unit.

The motor 80 is connected with the mixing chamber 11 by a suction pipe 81, the gas and the air flowing through the pipes 51 and 50, respectively, to the mixing chamber. The gas is generated by the generator 58 into which the air to be gasified flows in through the conduit 55. A throttle valve 57 which can be actuated arbitrarily is arranged before the gas generator 58. The quantity of mixture which enters the motor and accordingly also the output and number of revolutions of the motor are altered by changing the position of the throttle valve 57 by means of a lever 70 which may be operated by hand or by foot. The gas flows from the generator through conduit 51 into the mixing chamber 11. The air required for producing the mixture flows through the pipes 56 and 50 and is controlled or regulated by the throttle valve 49. The conduits 55 and 56 are combined with one another so as to constitute a common or joint conduit 54. The throttle valve 49 which is arranged in the conduit 56 and regulates the volume of air is operated by the diaphragm 1 through the lever arrangement 68, 69 in dependency of the pressure in the chambers 2 and 3. The chamber 2 is connected with the conduit 51 through the conduit 48, 52 while the chamber 3 is in connection with the pipe 30 through the conduit 53.

This device is operated in the following manner: By varying the position of the throttle valve 57 arranged before the generator the pressure in the gas generator 58 and in the conduit 51 may be altered. When the throttle valve is entirely opened the maximum volume of air enters the gas generator and the generator gas will be developed nearly at atmospheric pressure. However, when the motor is to be adjusted for a smaller output, the throttle valve 57 is closed

more or less and the gas flows into the mixing chamber at a smaller pressure. Therefore, the pressure in the conduit 50 will be higher than the pressure in the conduit 51. As a consequence, the pressure in the chamber 3 connected with the air conduit 50 through the conduit 53 will be higher than the pressure in the chamber 2 connected with the gas conduit 51 through the conduit 52, 40. Therefore, the diaphragm 1 moves down and holds by means of the lever arrangement 68, 69 the throttle valve 49 closed until the pressures in chamber 2 and chamber 3 are equalized or balanced. As, however, also the spring 82 is acting on the diaphragm 1, the condition of equilibrium will only be reached when the gas pressure in chamber 2 equals the sum of the air pressure in chamber 3 and the pressure of the spring 82. This spring 62 will be necessary in case the composition of the mixture has to be varied at smaller loads of the motor (with the throttle valve 57 being more or less closed) in such a manner that a richer mixture is obtained. The force of this spring ought to be the greater the more the composition of the mixture is required to differ.

In order to render the working of the motor sufficiently elastic, it is necessary that the number of revolutions per unit of time of the motor, which runs with a more or less closed throttle valve, is almost discontinuously increased by opening the throttle valve. For this purpose the mixture of gas and air should be richer in gas after the opening of the throttle valve i. e. during the acceleration of the motor than under normal conditions. This may be effected by having the opening of the throttle valve 49 in the air conduit lagging behind the opening of the throttle valve 57 in the gas conduit 55. This lag of the opening of the air throttle valve may be accomplished in different manners.

In order to effect this lag of the opening of the throttle valve, in the embodiment shown in Fig. 5 the air throttle valve 49 is influenced not only by the diaphragm 1, i. e. by the pressure difference between the pressures in the chambers 2 and 3, but also by a second diaphragm 61 separating the chamber above the wall 45 in two parts 59 and 60. The upper chamber 60 is connected with the gas conduit 51 through the conduit 52 and has the same pressure as the conduit 51. The chambers 60 and 59 are connected with one another through a small aperture 66 constituting a cataract and through the conduits 65 and 63. The cross section of the aperture 66 can be regulated by means of the screw 64.

Now, if the motor runs at a constant load for some time, the same pressure will be generated in the chambers 59 and 60. If however the pressure in the conduit 51 and accordingly also in the chamber 60 has been increased rapidly by a quick opening of the throttle valve 57, a downward pressure is exerted upon the diaphragm 61 against the action of the spring 62 till the pressures in the chamber 60 and 59 are balanced, through the cataract 66. By this downward pressure the opening of the throttle valve 49 is lagged. During this period the gas content of the mixture increases and the motor works under a higher load with acceleration. The adjusting screw 67 serves the purpose to limit the opening movement of the throttle valve 49.

In the neighbourhood of the running without load the composition of the mixture is very sensitive with regard to pressure variations and the relation between the composition of the mixture and the gas pressure follows a different rule than with higher loads. In Fig. 6 a device for the regulation of the running without load is shown.

The device shown in Fig. 6 corresponds in essence to the example shown in Fig. 5 and therefore the same reference numerals are used. However, the admission of air to the mixing chamber 11 and to the generator 53 takes place not only by way of the conduits 56 and 55 and the throttle valves 49 and 57, but also through the conduit 71—73—79 and an aperture 75, and through the conduit 71—72—78 and an aperture 74, thus shunting the throttle valves 57 and 49, respectively. The apertures 74 and 75, respectively, can be adjusted by screws 76 and 77, respectively. In view of the fact that the apertures 74, 75 are comparatively small, only a little portion of the air will flow through these apertures when the throttle valves 49, 57 are opened, the main part flowing through the conduit 55 and 56, respectively. If however the throttle valve 57 is closed, this resulting automatically in closing also the throttle valve 49, the volumes of air flowing through the conduits 55, 56 will decrease and therefore an increasing part of the total air volume flows through the conduit 71 and through the adjustable apertures 74, 75. When the throttle valve 57 and, therefore, also the throttle valve 59 is closed completely, the quality of the mixture or the ratio of air and gas is determined solely by the cross section of the apertures 74, 75. The cross sections of these apertures can be adjusted by means of the screws 76, 77 in such a manner that only the volume of air necessary for no-load running will flow into the generator and into the mixing chamber respectively, when the throttle valves 49, 57 are closed. Fig. 7 shows an embodiment of the invention in which variations of the temperature or of the caloric power are involved in the regulating process. In this embodiment a device sensitive to variations in temperature is exposed to the action of the gas which acts upon the device regulating the gas pressure.

In the embodiment shown in Fig. 7 the temperature-sensitive device consists for instance of two parts having different heat expansion, a base plate 82 and a bar 84. The base plate 82 is connected with the conduit through which the gas flows out of the generator in such a manner that the base plate takes up the temperature of the conduit. The bar 84 is pivotally mounted at 83 on this base plate, the other end of the bar being hinged at 85 to a lever 86 which is pivotally mounted on the base plate 82 at 87. The other end 88 of this lever 86 is connected to a bar 89 which at 90 acts upon a two armed-lever 92 pivotally mounted at 91. The other end 93 of the two-armed lever 92 cooperates with a spring 94 bearing upon the valve 8 which is acted upon by the diaphragm 1. The arrangement is analogous to that shown in Fig. 1. Through the conduit 4 the gas flows into the chamber 2 and from this chamber through the conduit 7 into the mixing chamber 11, the air flowing through the valve 8 into the chamber 3 and through the conduit 10 into the mixing chamber 11. From the mixing chamber the mixture flows through the conduit 12 to the motor. The air pressure in the chamber 3 is determined by the gas pressure in the chamber 2 on the right-hand side of the diaphragm 1 and by the pressure of the spring 94 on the left-hand side of the diaphragm because the air pressure must be equal to the difference of these two counteracting pressures. If

the spring pressure increases, the air pressure lowers whereby the mixture becomes richer in gas. This, as has been mentioned already, is necessary when the caloric power of the gas decreases i. e. when the gas leaves the generator at high temperature.

If for instance the base plate 82 is made of aluminium and the bar 48 of steel owing to the greater thermal expansion of aluminium the end 85 of the bar 84 gets into the position 85′ when the temperature raises. The lever 86, the end 88, the bar 89 and the two-armed lever 92, therefore, will get into the position 86′—88′—90′—93′ shown by dot-and-dash lines whereby the spring will be compressed. The power by which the air pressure in the chamber 3 has to keep up the equilibrium decreases because with unvaried gas pressure and greater spring power the resulting pressure against which the air pressure must be balanced decreases so that the air volume flowing to the motor diminishes. If, however, the temperature of the gas decreases, the pressure of the spring 94 diminishes and, therefore, the air pressure increases by the unequal deformation of the base plate 82 and the lever 84. In view of this change more air flows into the mixing chamber 11 and this is desirable with regard to a better quality of the gas.

Instead of the base plate 82 and the lever 84 also another regulating device responsive to temperature variations may be used as for instance boxes filled with gas or liquid. If the regulation is effected by a gas or a liquid, the resilient box containing this medium must be exposed to the temperature of the gas leaving the generator and must be connected with a regulating device in such a manner that a dilatation of the box compresses the spring 94.

The temperature-responsive device may also act in any other suitable manner upon the regulation of the mixture. In the embodiment shown in Fig. 7 the temperature-responsive device varies the ratio of pressure between air and fuel gas, but it could control also for instance the outflow cross sections of air and fuel gas.

EMIL SCHIMANEK.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. SCHIMANEK
METHOD AND DEVICE FOR REGULATING
THE RATIO OF MIXTURE OF GASES
Filed Nov. 29, 1941

Serial No.
421,060

2 Sheets-Sheet 1

Fig.1

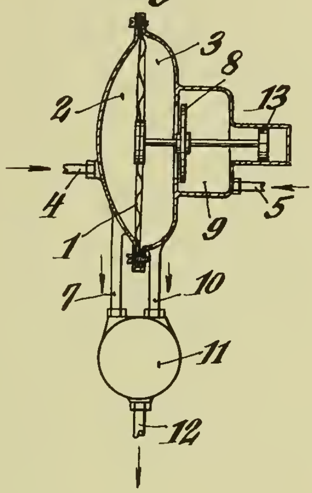


Fig.4

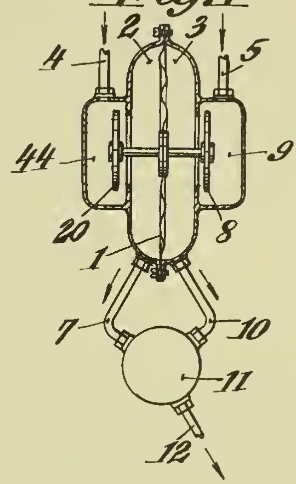


Fig.2

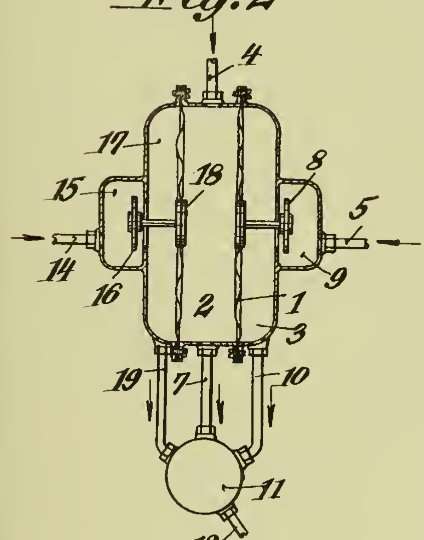
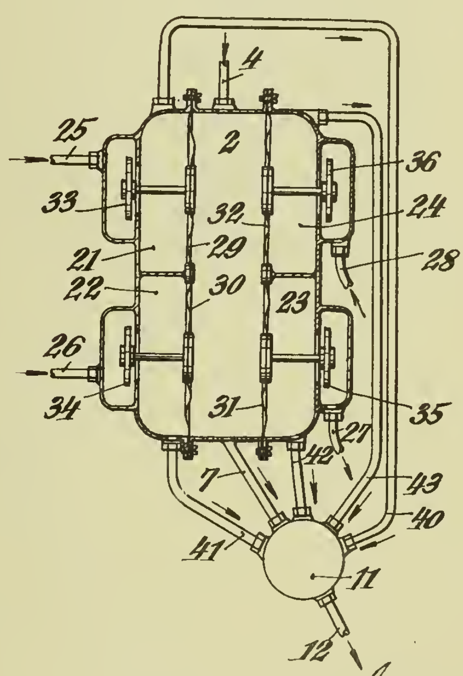


Fig.3



Inventor,
Emil Schimanek

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

E. SCHIMANEK
METHOD AND DEVICE FOR REGULATING
THE RATIO OF MIXTURE OF GASES
Filed Nov. 29, 1941

Serial No.
421,060

2 Sheets-Sheet 2

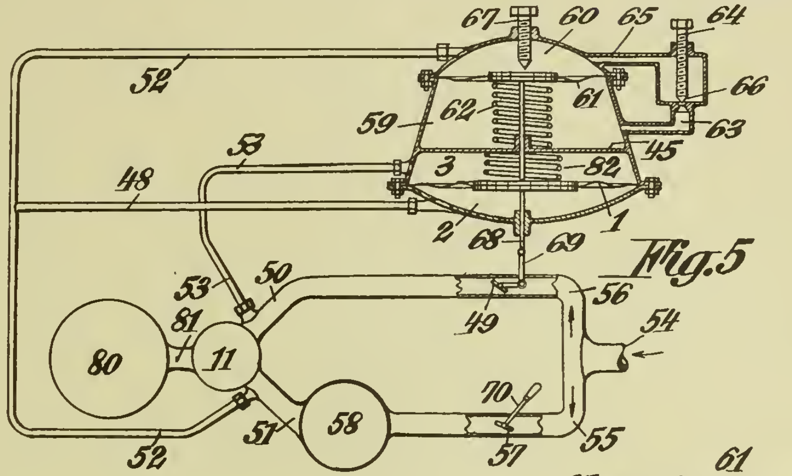
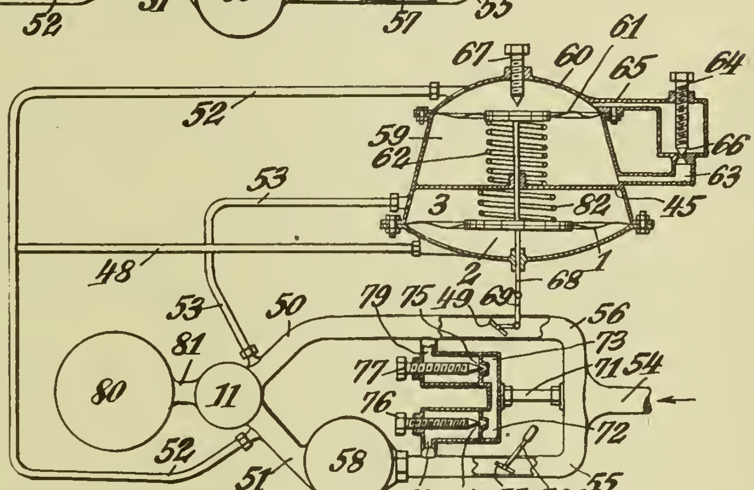


Fig.5

Fig.6



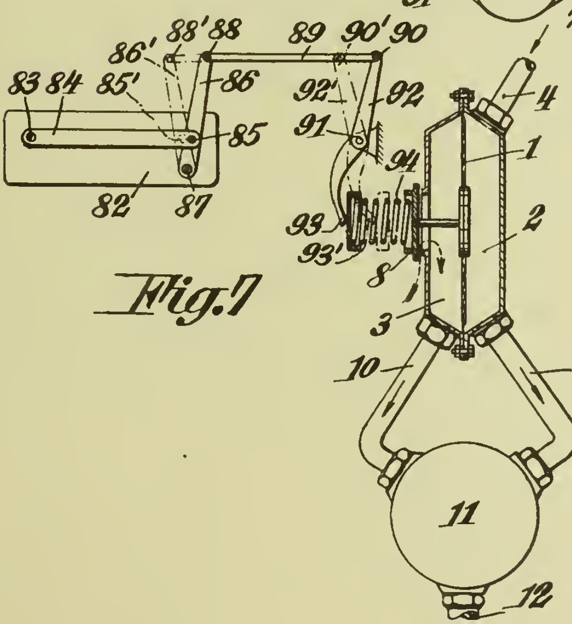


Fig.7

Inventor,
Emil Schimanek
By: Glascock Downing & Seebold
Attys.

Published May 11, 1943

Serial No. 420,409

ALIEN PROPERTY CUSTODIAN

PUMP STRUCTURE

Carl Schmitt, Leipzig C 1, Germany; vested in the Alien Property Custodian

Application filed November 25, 1941

This invention relates to a pump structure built into a vessel containing a pressure medium to be driven into telescopic lifting jacks for motor vehicles, and the present application is a divisional application from my co-pending application Ser. No. 373,239½, filed January 6, 1941.

The invention is illustrated by way of example in the accompanying drawing, in which

Figure 1 is a sectional view of the reservoir containing the pressure medium and of the pump;

Fig. 2, a side view of Fig. 1; and

Fig. 3, a section on the line A—A, of Fig. 1.

The structure comprises a reservoir **17** with inbuilt pump, which is arranged on a bracket **26** secured to a dashboard **25**. At the free end of the pump piston **18** a notch **19** receives a lever arm **20** mounted on a shaft butt **21** supporting a pump lever **22** which is swingable on the outside of the reservoir **17** and, by means of a spring **24**, can be actuated by the driver's foot through the medium of a connecting rod **23** projecting through the dashboard **25** into the interior of the vehicle. A stop **27** in the reservoir **17** limits the upward stroke of the piston **18**.

The pump cylinder is connected with the inside of the reservoir **17** by a horizontal channel **28** in which two balls **29**, **30** act as valve, the lower larger ball **30** abutting against a spring **32** and the upper smaller ball against a vertical bore **33** and a horizontal channel **34** which opens into an antechamber **35**. Above the vertical bore **33** a control piston **36** bears against a spring **37** and possesses locking means **38** for holding the piston in any desired position. A pin **39** of the control piston **36** engages the bore **33** and thereby the smaller ball **29**. Safety valves **40**, **41** are provided in the wall of the antechamber **35** as well as in the wall of the reservoir **17**.

The mode of operation during pumping and use of the jack is as follows:

When the piston **18** draws, the pressure medium passes through the channel **28** and past the valve balls **29**, **30** into the pump cylinder, and when pressure is exerted by the piston **18**, the control piston **36** will be forced down and with its pin **39** push the valve ball **29** against the larger ball **30**. The supply channel **34** for the antechamber **35** is thus freed from the closing action of the ball **29** which now blocks the channel **28** leading to the reservoir **17**, so that the pressure medium can flow into the antechamber **35** whence it passes through the conduit **12** into the telescopic jacks.

The jacks can be rendered inoperative by the weight of the vehicle. For this purpose, the pump piston **18** and the control piston **36** are brought into central position by the connecting rod **23** and the piston **36** is fixed in position by the locking means **38**, in consequence whereof the ball **29** releases the channels **28** and **34**, so that the pressure medium can flow back from the antechamber **35** into the reservoir **17** through the channels **34** and **28**. Excess pressure in the antechamber **35** is equalized by the valve **40**, or the pressure medium may escape through this valve to the reservoir **17**.

CARL SCHMITT.

FUBLISHED
MAY 11, 1943.
BY A. P. C.

C. SCHMITT
PUMP STRUCTURE
Filed Nov. 25, 1941

Serial No.
420,409

Only for examination. Original drawing will follow later.

Fig. 1

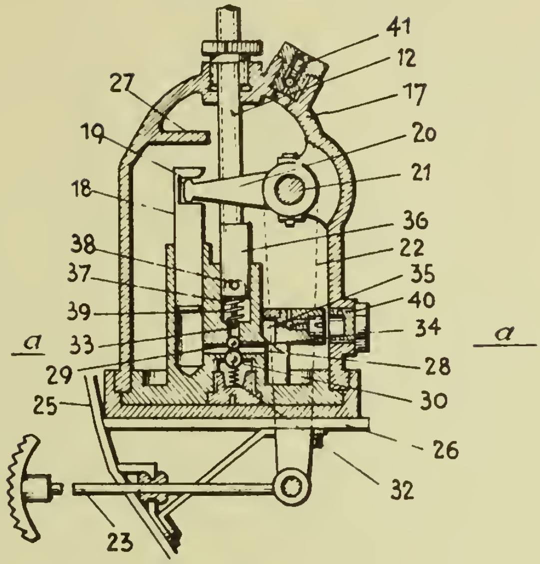


Fig. 2

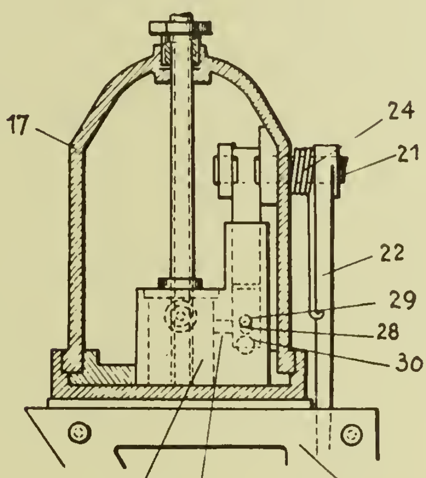
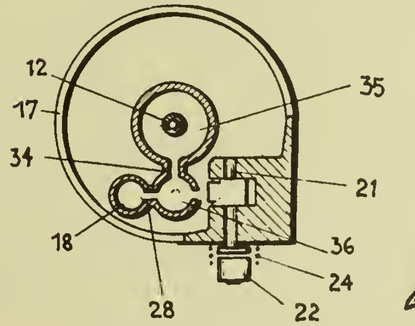


Fig. 3
Schnitt a a
Section



Inventor:
Carl Schmitt

Published May 11, 1943

Serial No. 421,061

ALIEN PROPERTY CUSTODIAN

FOUNTAIN PEN

Theodor Kovàcs, Wien 117, Germany; vested in the Alien Property Custodian

Application filed November 29, 1941

This invention relates to a fountain pen equipped with a "unit" adapted to be shoved into the bore of the front portion of the body of the pen holder and comprising the pen writing proper, the ink conducting and supplying member and a sleeve. With the known fountain pens of this type having a box arranged in the front portion of the holder—arranging the part of the box surrounding the pen outside the holder renders the packing or tightening difficult—the box fits accurately into the conical or cylindrical bore of the front portion of the holder and serves for holding said "unit" in place. Deformations of the sleeve by reason of tensions arising in the pen can cause jamming of the "unit" in the front portion of holders of the type mentioned which may entail damages at the pen holder in general and the pen proper in particular.

The above-mentioned drawbacks are overcome, according to the present invention, by the improvement that the outer diameter of the sleeve is made smaller than the diameter of the bore receiving it and serves for holding fast the rear portion of the ink conducting and supplying member which extends through and beyond it. Owing to that smaller diameter of the sleeve relatively to the bore into which it is inserted jamming of the "unit" in the front portion of the holder body is resurely and reliably prevented. The rear portion of the ink member extending beyond said sleeve can fit into the cylindrical bore of the body in such a manner as to be shiftable therein whereby the possibility is afforded that the "unit" can always be easily exchanged. It is also possible to provide for an additional clamping action by providing a longitudinal slot in the inner end of the ink member and bending the thus separated two ink member portions slightly asunder so that they constitute elastic portions able to exert a certain slight clamping action.

In a modified constructional form of the thus improved fountain pen the sleeve may extend over and beyond the ink member, that extension fitting then closely into the bore of the holder body whereby the ink body is securely retained therein.

In order to prevent the "unit" from turning in the holder body the front portion thereof may be provided with a transverse pin engaging a groove, which may be the air groove of the ink member, or said pin may be provided in this member in this member and engaging a groove of said front portion, all as fully described hereinafter.

The invention is illustrated diagramatically and by way of example on the accompanying drawing on which Figure 1 is a side-view of the "unit" composed of the pen proper, the ink conducting and supplying member and the sleeve. Figure 2 shows an axial section through these members, in connection with the front portion of the body of the holder. Figure 3 is a transverse section through the members shown in Fig. 2 in the line III—III, and seen in the direction indicated by the arrows, and the Figures 4, 5 and 6 show views corresponding to the Figs. 1–3 and relate to a modified constructional form of the improved fountain pen.

Referring to the constructional form shown in Figs. 1–3 the "unit" mentioned in the introduction of this specification consists of the pen proper **1**, the sleeve **2** and the ink conducting and supplying member **3**. In the front portion **5** of the body of the holder is a suitably narrow bore **5** serving for the reception of that portion **4** of the ink conducting and supplying member **3** which extends from the sleeve **2** into said front portion **5** of the body. The sleeve **2** is situated in a suitably larger bore of said body portion **5**. The part **4** fits into the part **5** in such a manner as to be shiftable therein, and the sleeve **7** fits into the bore provided for it with a certain play. In the part **4** is a longitudinal slot **8** and the ends thereby formed are slightly bent asunder so as to be able to exert an elastic action and there is, furthermore, in said part **4** a transverse pin **10** engaging with its inner end a longitudinal air passage **11** provided in the ink conducting and supplying member **3**.

The manner of operation of the fountain pen is as follows:

Owing to the elasticity of the pen which is pressed against the ink supplying member **3** by means of the sleeve **2** this latter will be deformed in the course of time, but the gap left in the bore **7** is large enough to allow of even a large deformation of the sleeve without entailing jamming thereof, whereby an easy exchangeability of the "unit" is warranted. The part **4** is not subject to deformations and can, therefore, fit into the bore **6** of the body in such a manner as to be comparatively easily shiftable therein. In the whole the "unit" is reliably seated and tightened in the holder body. The elasticity of the ink member **3** at its inner end permits of a somewhat slighter accuracy of the seat thereof in the holder body. The pin **10** engaging the air passage **11** prevents the "unit" from turning in the body.

In the modification shown in Figs. 4–6 the sleeve **12** extends nearly over the entire lower

portion 13 of the ink member 14. Where the sleeve embraces the inner portion of the pen 15, there it is tapered relatively to its other portion 16, this portion fitting more accurately into the cylindrical bore of the front part of the holder body, but being, nevertheless, shiftable therein, so that the "unit" is guided, but also held in its proper operative position. There is also with this modified constructional form a gap between the free end portion of the sleve 12 and the surrounding end portion of the holder body, where there is the inner end of the pin, and thus jamming of the "unit" within the bore of the body owing to a deformation of the sleeve securely and reliably prevented.

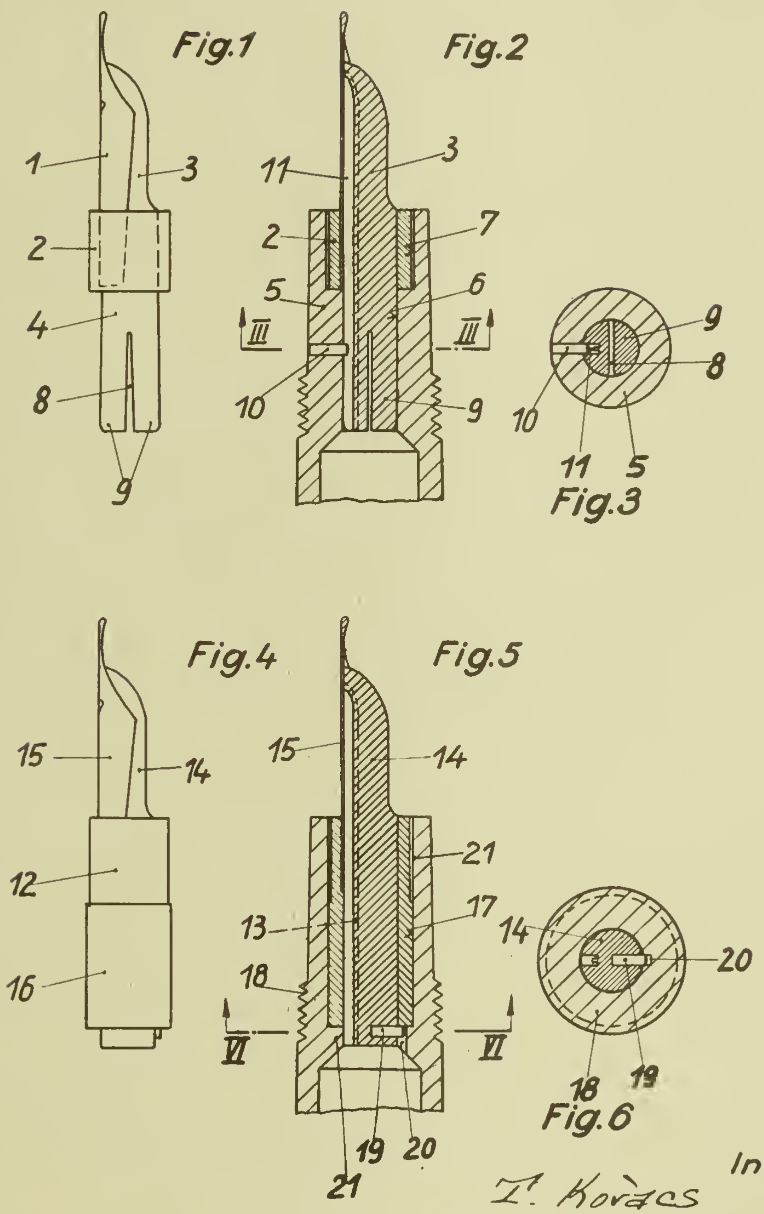
In order to prevent the "unit" from turning a pin 19 is inserted into the ink member 14 and engages with its outwardly projecting end a groove 20 provided in an inner shoulder 21 of the holder body, this shoulder forming an abutment for the sleeve 16, as shown in Fig. 5.

THEODOR KOVÀCS.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

T. KOVÁCS
FOUNTAIN PEN
Filed Nov. 29, 1941

Serial No.
421,061



Inventor,
T. Kovács

By:
Glascock Downing & Seebold
Attorneys.

Published May 11, 1943 Serial No. 421,062

ALIEN PROPERTY CUSTODIAN

FOUNTAIN PEN

Theodor Kovàcs, Wien 117, Germany; vested in the Alien Property Custodian

Application filed November 29, 1941

This invention relates to a fountain pen provided with an annular compensation chamber arranged in the bore of the neck portion of the pen. Said chamber is formed in the known fountain pens by a body inserted into said bore and having a diameter which is by about 1 mm smaller than the clear width of the bore whereby an annular intermediate space, viz. said annular chamber, is formed. This latter is completely open at its lower end, viz. in the direction to the tip, whereas it communicates at its other end with the ink receptacle either by helical air-passages or by air passages disposed in staggered arrangement. The intermediate annular space is intended and adapted to receive any surplus of the ink, but the ink entering thereinto through said passages does not fill said chamber uniformly and fully, especially if the said chamber is comparatively long, because the downwardly trickling ink closes the deeply located aperture connecting the compensation chamber with the exterior air prior to the chamber becoming completely filled. It is from this reason that the annular compensation chamber is open around its entire circumference, but this arrangement entails the risk that ink can unintentionally leave said chamber.

The object of the present invention is to render it possible that the compensation chamber becomes uniformly and completely filled and to prevent the ink from leaving it unintentionally. This is attained by means of thread-like ribs subdividing the annular intermediate space into broad thread-like fields connected with one another at their upper parts with the ink receptacle by means of the narrow air-passages, whereas their lower parts communicate with the outer air. The ribs separating said fields from one another may be provided at the above-mentioned inserted body or at the inner wall of the neck portion of the fountain pen or between this wall and said body. Providing said ribs at the inner wall of the neck portion is to be preferred because flowing over of the ink from one field into a neighboring one will then be most reliably prevented.

The invention is illustrated diagrammatically and by way of example on the accompanying drawing which shows in axial section the lower half of a fountain pen improved according to this invention.

On the drawing, 1 denotes the neck portion of the pen, and 2 denotes the hollow body inserted into the bore of said portion and having the writing tube 3 attached to it, and into the bore of said body is inserted the plunger 4 which is equipped with the cleaning needle. The inner wall of the neck portion 1 is provided with the thread-like narrow ribs 5 5′ which surround closely the hollow body 2 and subdivide the compensation chamber formed by said members into thread-like disposed broad fields 6 6′ which communicate at their upper parts with the ink receptacle by the intermediary of the transverse bores 7—7, whereas they extend at their lower parts to the orifice of the neck portion; they become narrower in upward direction.

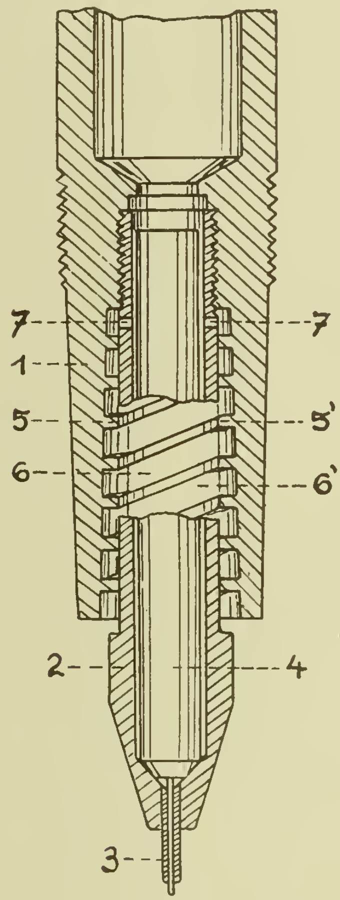
Ink penetrating from the ink receptacle through said transverse bores owing to having become hot or from any other reason must, under circumstances, overcome a rise and it may occur that it flows from any one of said fields to and into an adjacent one. Such an undesired occurrence is fully prevented by the provision of the ribs, as described. The fields become narrower in the direction to the ink receptacle and the surplus of in which they have taken up is uniformly conducted away during writing. The thread-like ribs prevent the ink from being shaken off from the compensation chamber.

THEODOR KOVÀCS.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

T. KOVÀCS
FOUNTAIN PEN
Filed Nov. 29, 1941

Serial No.
421,062



Inventor,
T. Kovàcs

By:
Glascock Downing & Seebold
Attorneys.

Published May 11, 1943 Serial No. 421,249

ALIEN PROPERTY CUSTODIAN

PREPARATION OF POWERFUL SOLUBLE TUBERCLE BACILLI ANTIGEN

Yu Maekawa, Nakano-ku, Tokyo, Japan; vested in the Alien Property Custodian

No Drawing. Application filed December 1, 1941

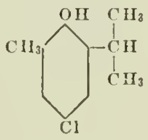
This invention relates to the preparation of powerful soluble tubercle bacilli antigen for use in the treatment and prevention by inoculating it to the human body.

The object of this invention is to produce the powerful soluble tubercle bacilli antigen which is injected to the selected persons having the individuality of immunity producing temperament, thus obtained blood, plasma and serum in said human body is used to cure the tubercle disease.

In the process of manufacturing the tubercle antigen according to this invention, the living tubercle bacilli culture of powerful virulence is mixed in 40% aceton which is combined with 0.1% chlor-calvacrol, then the bacilli is dispersed by stirring and stored in an air-tight glass container which is frequently shaken, the mass kept therein for several days and then it is separated by the centrifugal means, thus a supernatant yellowish fluid is obtained, which is referred to as the Solution I and retained air-tightly. After being dried the said bacilli mass, is weighted and ground in a porcelain mortar to fine powder. When the bacilli has lost its rod-forms and acid-fastness and become indefinite colloidal form by testing under a microscope, it is again weighted and then it is mixed into physiological salt solution which contains 0.1% chlor-calvacrol, and the soluble ingredient is separated from the bacilli by the centrifugal means, thus a supernatant fluid is adapted which is referred to the Solution II, and it is retain air-tightly. At last, the precipitated bacilli mass is again ground and mixed into 40% aceton which contains 0.1% color-calvacrol, thus the soluble ingredient is separated and a supernatant fluid is obtained which is referred to as the Solution III. The precipitated material is abandoned. Thus retained three supernatant fluids are mixed, and filtered through porcelain filter, and a slightly yellowish turbid fluid is obtained. This fluid is the Powerful Soluble Tubercle Bacilli Antigen prepared according to this invention. 1 c.c. of this fluid contains 0.035 gr. of the above mentioned tubercle bacilli in raw state. This original solution 1 c.c. is calculated as 10,000 units of this antigen.

In use I provide a 10,000 times diluted solution of this antigen. For adult persons inoculation dose begins with 1 c.c. (one unit), and after disappearance of the reactions doses are successively increased. For the purpose of cure for patient it is repeatedly applied until the disease being cured. For the purpose of prophylaxis of tuberculosis the inoculation of final dose 1.0–5.0 c.c. of the original solution per 50 kg. body-weight suffices. For children dose is decreased in proportion to body-weight.

In the preparation for the tubercle antigen according to this invention, aceton and physiological salt solution are combined with chlor-calvacrol



therefore this chlor-calvacrol acts to soften and destroy the cover film of bacilli made of sebaceous material, thus the bacilli are killed surely, accordingly thus prepared antigen can be easily absorbed into the tissue of the human body, therefore the immunity can be produced rapidly in said human body and moreover this antigen does not remain in the injected portion of the body owing to its great absorptive nature, therefore accessory action such as suppuration can be avoided.

And the therapeutic application of this antigen in such a case of unpreparedly application to acute, sub-acute and chronic patient is liable to aggravate the disease on account of its potent virulence. In such circumstances, before the application of this antigen, the disease focus may be cured or suppressed completely or relatively by use of tubercle immune blood and serum which is obtained by inoculation of tubercle bacilli and their products (chiefly this antigen) into persons of an individuality to be highly immunized; thereupon the active immunizing faculty is quickened to increase by inoculation of this antigen at the proper time.

On the contrary the chronic non-phthisic type is in many cases cured by amelioration of the whole body and suppression of symptoms through repeated inoculations of this antigen.

YU MAEKAWA.

Published May 11, 1943

Serial No. 421,394

ALIEN PROPERTY CUSTODIAN

METHOD OF DRYING ARTIFICIAL SAUSAGE SKINS

Julius Wolff, Amstenrade, Holland; vested in the Alien Property Custodian

Application filed December 2, 1941

The present invention relates to a method of drying artificial sausage skins.

In the known plants for drying artificial sausage skins made from impregnated fabric tubes in which a plurality of tubes is withdrawn from vertical mandrels and for the purpose of suspending is carried upwardly through an annular gap by a common supporting device, the supporting devices at the upper end of the vertical stroke where simply suspended from horizontal supporting bars upon which they remained untouched until the drying process was terminated. The impregnating device located on the floor of the work room was moved upon rails extending in parallel to the upper suspension bars so that the group of tubes drawn upwardly each time together with its supporting device was simply suspended behind the already suspended groups, whereupon the impregnating device was further moved upon the rails to produce the next group. To allow the supporting device, consisting of a simple horizontal beam, to be brought over the suspension bars, the impregnating device together with the supporting device was to be rotated about a vertical axis of such a degree that the supporting beam passed between the suspension bars, in order to be then rotated into the transverse position and to be suspended.

This method was rather complicated and required impregnating devices moving on rails which again required a continuous change of the position of the men attending the method who progressively had to travel from the one end of the work room to the other.

Compared with this method a substantial improvement is obtained if in accordance with the present invention the impregnating device is stationary and the individual groups of the impregnated tubes are automatically suspended at the upper end of their vertical stroke from horizontally moving endless chains which after each individual winding up of a new group intermittently are moved, until the entire production of a period of the working time is suspended from the chains, dried in the time between two periods of working time and removed by groups again during the next period of working time at the other point of reversal of the chains by vertically movable endless conveyor chains.

A device for carrying out the method according to the present invention is shown in the accompanying drawing by way of example.

In this drawing:

Fig. 1 shows a longitudinal view of the general arrangement of a plant according to the invention,

Fig. 2 is a side view of the plant illustrated in Fig. 1, and

Figures 3 and 4 show the corresponding parts of Figures 1 and 2 respectively on a larger scale.

Upon the bottom of the work room the impregnating device 1 is arranged. The latter, for instance, consists of a frame having an upper supply trough 2 for the liquid impregnating mass and a lower trough 3 for receiving the mass eventually flowing off. In the bottom 2*a* of the trough 2 holes for inserting annular nozzles 2*b* are provided through which the tubes withdrawn from a vertical tube arranged below the trough 2 are pulled upwardly, whereby they are impregnated by the mass present in the trough 2.

The individual impregnated tubes 4 are by groups, in the construction shown for instance in three parallel groups, suspended, by means of hooks, from transverse beams 5 which are supported side by side by lateral discs 6. These discs in turn are suspended from a transverse beam 7 provided at both ends with pins 8 projecting outwardly which may be hung in in laterally arranged vertically movable conveyor chains 9. These chains are led over upper and lower sprocket wheels 10 and 11 respectively which are rotated either by hand or by a motor. The sprocket wheels 12, the chains 13, the wheels 14 and the transverse shaft 15 transmit the uniform movement to the other side.

As soon as a complete group of tubes, corresponding to the number of the individual nozzles, is wound upwardly in the manner described, these tubes are deposited upon a horizontal conveying device 16 arranged below the ceiling of the room. At the upper point of reversal the projecting pins 8 of the beam 7 drop off the vertical chains upon the horizontal endless conveyor chains 17 which are led over sprocket wheels 18 and 19. As soon as a finished group of impregnated tubes has been wound upwardly it is moved upon the horizontal conveying device 16 for a sufficient distance to be withdrawn from the range of the impregnating device and so to provide space for a new group. The method is continued in this manner, until the entire daily production is suspended from the upper track. In this condition the tubes are dried over night. On the next day the process is continued by impregnating new tubes. At the other end of the conveyor track 16 the tubes dried over night are by groups successively lowered again from the upper track by means of a vertical endless chain 20. The dry tubes are removed to be further treated.

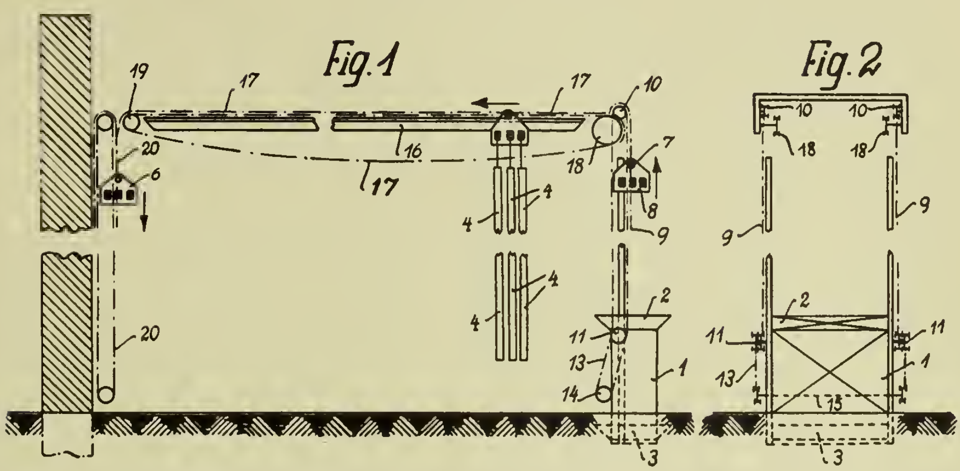
The details of the device for carrying out the new method may be more or less changed without altering the method itself and without departing from the present invention.

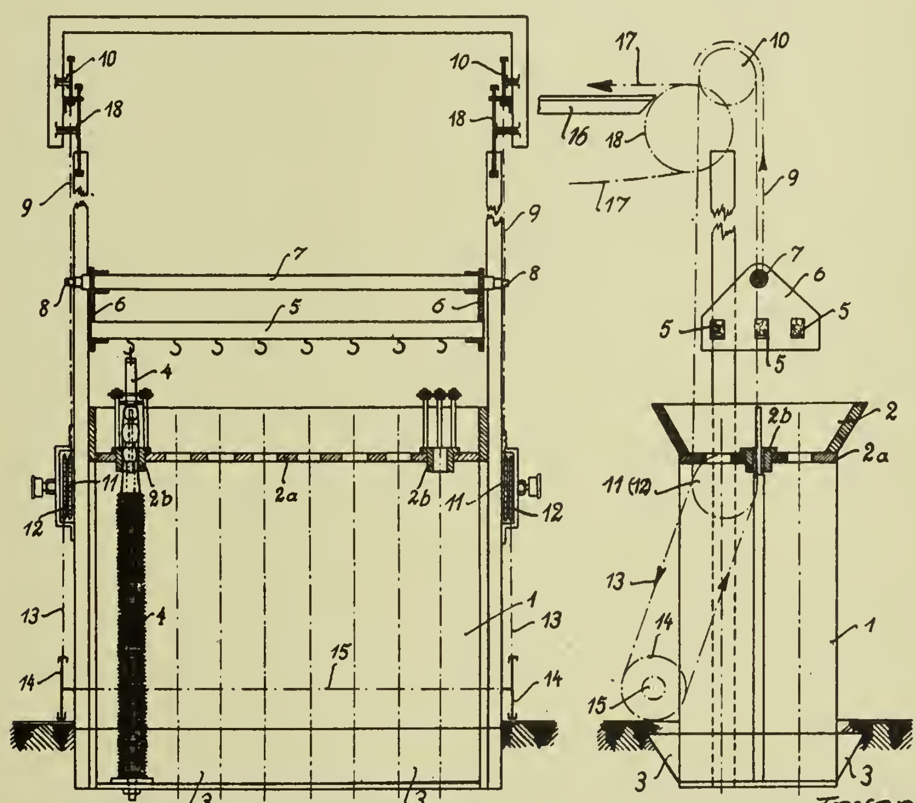
JULIUS WOLFF.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

J. WOLFF
METHOD OF DRYING ARTIFICIAL SAUSAGE SKINS
Filed Dec. 2, 1941

Serial No.
421,394





J. Wolff
Inventor
By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 421,395

ALIEN PROPERTY CUSTODIAN

METHOD OF AND A DEVICE FOR THE MANUFACTURE OF ARTIFICIAL SAUSAGE SKINS

Julius Wolff, Amstenrade, Holland, vested in the Alien Property Custodian

Application filed December 2, 1941

The present invention relates to a method of and a device for the manufacture of artificial sausage skins.

It is well known to make artificial sausage skins from fabric tubes or the like impregnated with suitable materials, whereby the tubes are withdrawn from vertical mandrels, guided through annular gaps and passed upwardly, whereupon they are dried and further treated. With these known methods the impregnation of the tubes in most cases was effected from the outside. However, it has also been proposed to impregnate from the inside. Now, in accordance with the invention the fabric tube is to be impregnated simultaneously within and without with the same mass. The impregnation effected from the outside is carried out in the hitherto usual manner, whereas the impregnation effected from the inside is carried out by suitable devices mechanically pressing the mass into the interior of the tube. The mass thereby is pressed against the inner wall of the tube and is then smoothened by wiper rings, whereas the superfluous material is stripped off.

The principal effect obtained hereby is that the fabric tube is completely embedded into the organic impregnating mass. This is of particular importance if the tube-like fabric totally or partially consists of artificial silk which itself is less suitable for the purposes of the invention than natural silk. The tube having both sides impregnated in accordance with the method of the invention, is then treated with an air current flowing through the tube until it is completely dry. In a manner known per se, the upper end of the tube is suspended from a ring so that the air flowing in from below may escape again at the upper end. In this manner the sausage skin is maintained tight until it is completely dry and, therefore, during drying no folds or crumples are formed which would contribute to weaken the sausage skin. Due to the fact that the inflowing air may escape again at the upper end it is also prevented that the impregnating mass, introduced into the sausage skin, is pressed outwardly through the loops of the fabric. The double impregnation, i. e. the within and without impregnation, is of particular importance as hereby the tube-like fabric is completely embedded into the impregnating mass, whereas with an impregnation at one side only the other side of the tube-like fabric often was left completely free and could be withdrawn from the hardened impregnating layer. Now, for the manufacture of the fabric, serving as skeleton for the sausage skin, such fibrous materials may be used which are sensitive to moisture or atmospheric actions. Moreover, this double impregnation causes a substantial reinforcement and a considerable denseness of the sausage skin. However, as the impregnating mass is porous like a skin, the sausage skin, in spite of the considerably increased denseness, maintains the necessary porosity, so that the sausage mass incorporated in the sausage skin may sufficiently exhale. The respiration of the sausage skin of which usual is the question under experts, therefore, is not influenced by the double impregnation.

Moreover, the inside impregnation may, in accordance with the invention, be carried out in such a manner that here the fibres of the mass obtain another direction as the fibres of the outside impregnation. If the latter is effected for instance vertically by drawing upwardly the sausage skin through an annular nozzle, the fibres of the inside impregnation may receive a helical direction upon the inner wall of the tube for instance under an angle of 45° towards the left or towards the right. If, however, the outside impregnation also is effected helically, then the inside impregnation is effected in the same manner but in an inversed direction, that is to say, with a right hand rotation at the outside in a left hand rotation at the inside or vice versa. In any case a position of the fibres of the mass crossing each other is obtained which causes a further substantial reinforcement of the sausage skin. Such a helical impregnation may, for instance, be obtained by correspondingly guiding the mass against the outer and inner wall of the tube respectively.

In the accompanying drawing a device for carrying out the method according to the invention is shown by way of example.

In this drawing:

Fig. 1 shows a sectional view of the total arrangement of a device according to the invention without representing details, and

Fig. 2 is a section through the impregnating device.

Mounted upon a frame *a* is a supply trough *b* for the reception of the impregnating mass. The lower bottom *c* of the frame *a* supports a tube *d* to which the supply pipe *e* is connected arranged outside the frame *a*. The mass is by way of a hose supplied to the pipe *d*, for instance, from a pump or a tank arranged at a higher level. The vertical pipe *d* extends through an annular nozzle *f* which is held in a bottom opening *g* of the trough *b*. In other openings *g* any desired num-

ber of annular nozzles f with appertaining stand pipes d may be arranged depending on the number of artificial sausage skins to be impregnated and drawn upwardly. With regard to the stand pipe d the annular nozzle f has so much play that the fabric tube h may easily be passed through. This fabric is mounted upon a special supporting tube i which is shifted upon the stand pipe d after the annular nozzle f has previously been withdrawn.

In a manner known per se the fabric tube h is drawn upwardly through the annular nozzle f and suspended from the ceiling. In the interior of the tube and above the annular nozzle f a distance member k having a convex outer surface is mounted upon the pipe h. This distance member k extends close to the upper discharge end of the nozzle f and at this point provides a small annular gap for the passage of the tube. Somewhat above this distance member a second distance member k_1 having a convex outer surface is mounted upon the pipe d which preferably is connected to the lower distance member k by an intermediate pipe member. The distance member k_1 at this point maintains the tube slightly tensioned. Mounted upon the upper end of the stand pipe d is a tube-like nozzle l with lateral slots m through which the impregnating mass penetrates into the intermediate space between the nozzle and the wall of the tube. Here the impregnating mass comes into intimate contact with the fabric, whereas simultaneously also the mass present in the trough b impregnates the tube from the outside. Mounted at the upper end of the nozzle l is a shank t for setting up a head n which is provided with external grooves o which are arranged in spaced relation one above the other and serve the purpose of holding wiper rings p. The latter slightly stretch the tube from the inside so that the mass is smoothened down at the inner wall. Midway between the rings p, however, a wiper ring q is provided which surrounds the tube at the outside and which is slightly floatingly and resiliently held for instance by connecting same by means of thin wires or threads r to vertically arranged helical or coiled springs s the lower ends of which extend into bores of the annular nozzle f and are fixed therein. In this manner the outer wiper ring q may freely move into all directions and may easily and resiliently adapt itself to the movements of the tube. The inner diameter of the ring q is somewhat smaller than the outer diameter of the rings p, whereby at this point a certa n contraction of the tube is caused.

To apply the impregnating mass within or without in a helical direction to the wall of the tube, corresponding guides indicating the direction, for instance, obliquely arranged ledges, may easily be provided. Moreover, the slots m may correspondingly be arranged obliquely or helically.

The device for carrying out the new method could, of course, more or less depart from the construction shown by way of example without departing from the spirit of the invention.

JULIUS WOLFF.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. WOLFF

METHOD OF AND A DEVICE FOR THE MANUFACTURE OF ARTIFICIAL SAUSAGE SKINS

Filed Dec. 2, 1941

Serial No. 421,395

Fig. 2

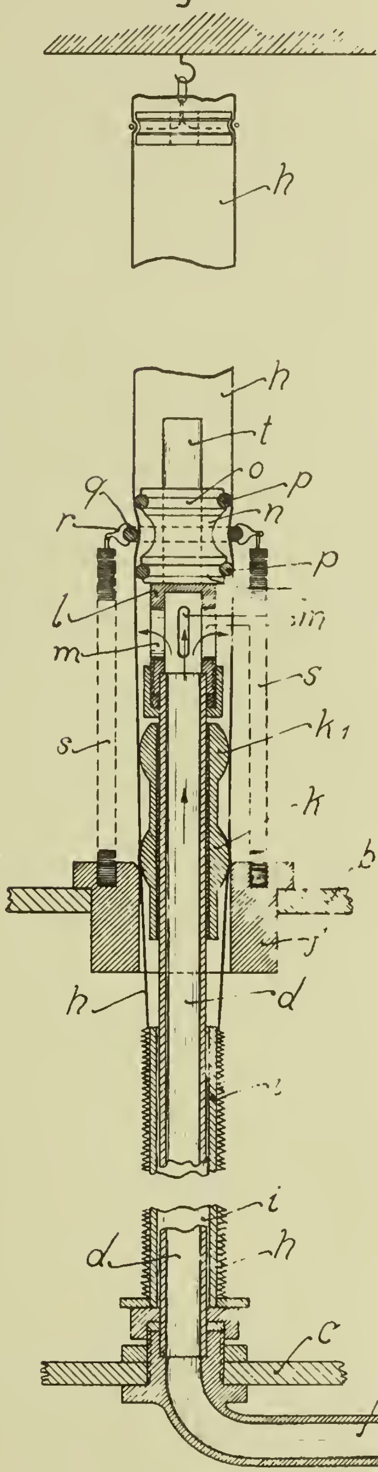
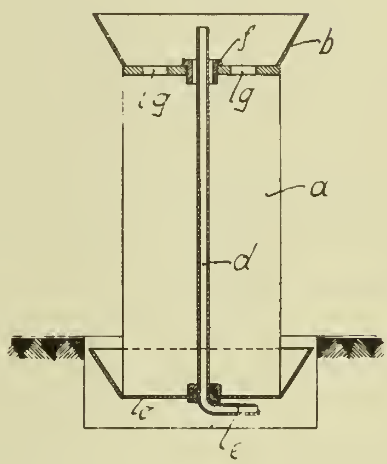


Fig. 1



Inventor,
J. Wolff

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 421,396

ALIEN PROPERTY CUSTODIAN

METHOD OF AND AN APPARATUS FOR PRODUCING ARTIFICIAL SAUSAGE SKINS

Julius Wolff, Amstenrade, Holland, vested in the Alien Property Custodian

Application filed December 2, 1941

The present invention relates to a method of and an apparatus for producing artificial sausage skins.

In the manufacture of artificial sausage skins it is known to impregnate the outer or inner wall or surface of tubular fabrics with a suitable fibrous mass consisting of animal substances. For this purpose, the tubular fabric is drawn upwardly through an annular gap and hereby the impregnating mass is applied within or without to the tubular fabric.

According to the method of the present invention an impregnating mass is applied to the tubular fabric simultaneously without and within so that the outer- as well as the inner surface of the finished tubular fabric is coated with an impregnating layer. In connection with such an impregnation it is of particular advantage to so carry out the coating of both faces of the fabric sleeve with the fibrous material, that the fibres at both sides or surfaces of the wall of the fabric sleeve cross each other. Hereby a special reinforcement of the impregnation and therewith a greater strength and durability of the artificial sausage skin is obtained. This is of particular importance if the tubular fabric is made of artificial silk which is not as strong as natural silk and, moreover, is more sensitive to moisture. Owing to the arrangement of the fibres in directions crossing each other upon the inner wall and the outer wall of the artificial sausage skin, the lower strength of the finished tubular sausage skin made of artificial silk is compensated by the reinforcement of the impregnation and, moreover, the sensitivity of the artificial silk to moisture is rendered effectiveless by the fact that the tubular fabric is completely embedded in the fibrous mass.

The arrangement of the fibres of the two impregnating layers in directions crossing each other at the inner and outer surface of the artificial sausage skin is obtained in accordance with the invention by the fact that the inner and outer wiper members for the impregnating mass are rotated relatively to each other, while the tubular fabric is longitudinally drawn along these members. Hereby the fibres present in the impregnating mass are adjusted in the direction in which the wiper members move along the wall of the tubular fabric. If the wiper members are uniformly rotated about the axis of the moved tubular fabric, the fibres are helically directed, but if the inner wiper members rotate in a direction opposite to that of the outer member, the fibres are arranged in directions crossing each other, the angular position of the fibres relatively to each other corresponding to the speed of movement of the tubular fabric as well as of the wiper members. Depending on the speed selected, the fibres may be arranged in a more flat or steep direction, and, moreover, the angular position upon the inner- or outer side or surface may be differently chosen, if the wiper members are rotated with different speeds also.

For carrying out the method according to the present invention preferably an apparatus is used as is shown by way of example in the accompanying drawing.

In this drawing:

Fig. 1 is a vertical section of the general arrangement of an impregnating apparatus without showing details of the apparatus, and

Fig. 2 shows a broken away section through the same appartus on a larger scale, more particularly illustrating the special devices for carrying out the new method arranged at the upper and lower part of the apparatus.

Mounted upon a lower trough *a*, serving to receive impregnating mass eventually flowing off, is a frame *b* the upper end of which carries a trough *d* in about the height of a table above the floor *c* of the work room. In the bottom of the trough *d* any desired number of impregnating devices, depending on the selected number of tubular fabrics to be treated, is arranged side by side in one row. In the drawing, showing a cross section through the trough, the other devices are arranged behind the device illustrated, so that they are invisible. In the bottom of the trough *d* holes are provided into which the individual impregnating devices may be inserted. For this purpose each device is provided with a cylindrical bushing *e* having an upper supporting flange *f*.

In the middle axis of the bushing *e* a vertical pipe *g* is arranged which is fixed in the bottom of the lower trough *a* and extended through this bottom downwardly, where a horizontal pipe *h* is connected, introducing the impregnating mass into the interior of the pipe *g* to flow upwardly therein and to be discharged through openings *i*, provided in the wall of the pipe *g* above the flange *f* of the bushing *e*, into the space between the pipe *g* and the tubular fabric *k* to be impregnated.

Any desired length of tubular fabric *k* is pushed upon a pipe *l* which in turn is pushed over the stand pipe *g* and extends to the bottom of the trough *a*. The upper end of the tubular fabric *k* is withdrawn from the supporting pipe *l* and pulled upwardly through the bushing *e*. Within

the latter a distance member m having a convex surface is mounted upon the pipe g. The outer diameter of the distance member m is somewhat smaller than the inner diameter of the bushing e, so that an annular gap is formed through which the tubular fabric may be drawn.

Within the pipe g a long spindle n is rotatably mounted the diameter of which from below the supply pipe h until above the discharge openings i is substantially smaller than the inner diameter of the pipe g, so that the impregnating mass may unimpededly be fed upwardly in the pipe g. Both ends of the spindle n are enlarged to the inner diameter of the pipe g so that above and below the mass cannot be discharged. To this purpose, moreover, special sealing means may be provided at the ends of the pipe g. The lower end of the spindle is extended through the pipe g and carries a worm wheel o which by means of a cylindrical projection or rim p is journalled in a ball bearing q. The drive of the worm wheel o is effected by the worm r the shaft s of which simultaneously drives the worms and worm wheels of the other devices. The drive may be effected by an electromotor.

The upper end of the spindle n also extends through the pipe g and is provided with a square t upon which may be mounted two supporting bodies u for the inner wiper members v. The latter consist of circular discs the edges of which are rounded off. These discs are rotated by way of the supporting bodies u by means of the spindle n. At the outer side or surface of the tubular fabric k another wiper ring w is arranged in a level between the two inner wiper members v. The wiper ring w is fixed to a worm wheel x rotated by a worm y the shaft z of which simultaneously drives the worms of the other devices in the same manner as the lower shaft s drives the worms as described above. The worm wheel x runs on a ball bearing which is supported by way of the bolts or studs z' from the flange f of the bushing e.

If the worm wheels o and x are rotated in opposite directions, the inner and outer wiper members v and w respectively rotate correspondingly and thereby also correspondingly apply the fibres of the impregnating mass to the tubular fabric k, so that the fibres upon the inner- and outer side respectively cross each other. Details of the device may, of course, be modified without departing from the spirit of the invention.

JULIUS WOLFF.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

J. WOLFF
METHOD OF AND AN APPARATUS FOR PRODUCING
ARTIFICIAL SAUSAGE SKINS
Filed Dec. 2, 1941

Serial No.
421,396

Fig. 2

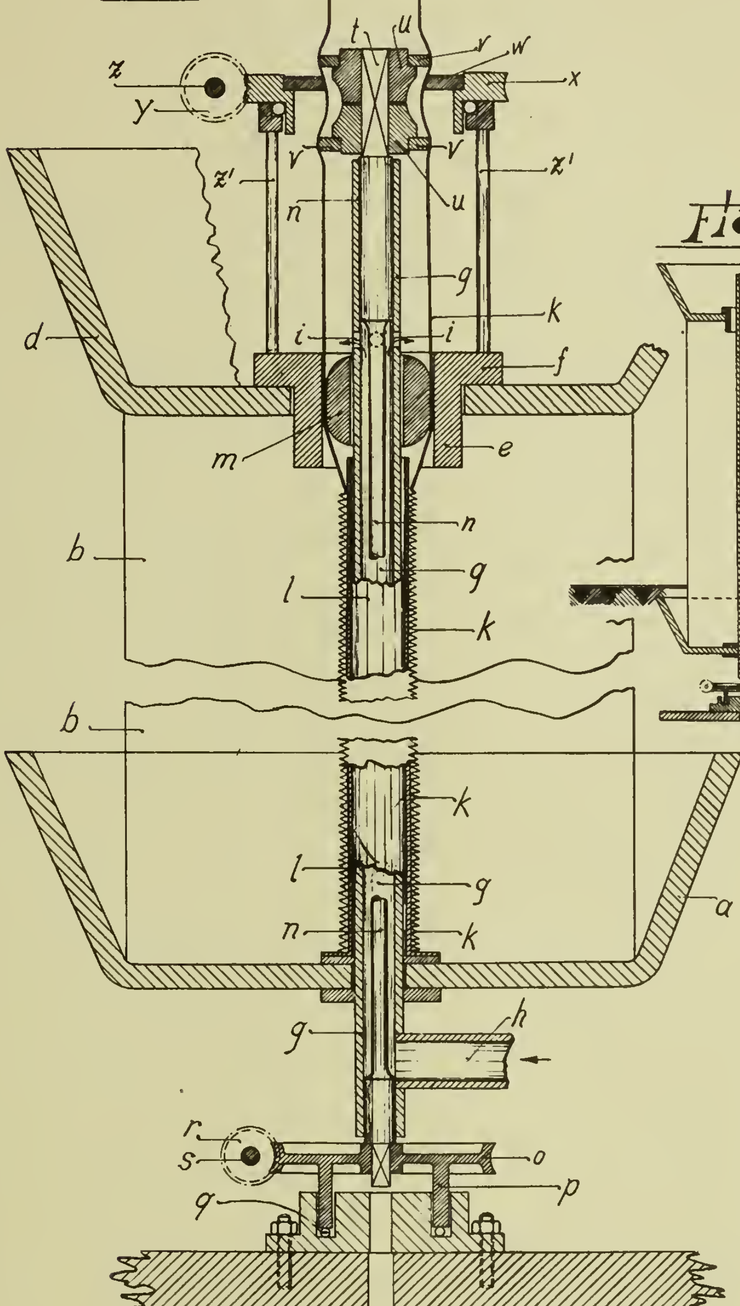
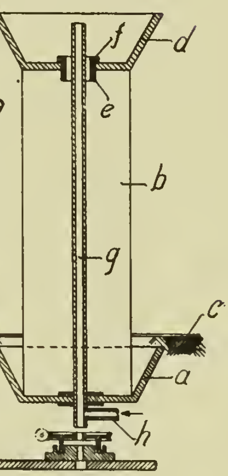


Fig. 1



Inventor
J. Wolff

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 421,960

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF ARTICLES MADE OF IRON AND STEEL WITH CORROSION-PROOF SURFACE

Gottfried Becker, Buderich b. Neuss, and Karl Daeves and Fritz Steinberg, Dusseldorf, Germany; vested in the Alien Property Custodian

No Drawing. Application filed December 6, 1941

The surface of articles of iron or steel can be rendered corrosionproof thereby, that they are chromed by thermic diffusion. In this known method carried out generally with employment of gaseous chromium carriers, the chromium exchange from the gas against an approximately similar quantity of iron of the parts to be treated, in that at this exchanging layers of chromium are produced on the surface of the articles which, similar as those produced at the cementation with the fundamental material, are most intimately connected and grow together with the fundamental material.

The carbon content of the iron- and steel alloys employed for the production of the articles to be subsequently chromed causes, as is known, in so far serious difficulties at the chroming, as the carbon of the fundamental material forms carbides together with the chromium which diffunds in, said carbides checking the further penetration of the chromium layers.

It was believed, that this inconvenience could be sufficiently obviated by the prescription not to increase the carbon content of the iron to beyond 0.2%. Applicants have, however, ascertained that for the chroming capability and the quality of the chroming zones of the iron carbon alloys then produced not only the percentage of the carbon content of the alloys, but the total quantity of the carbon contained in the steels is decisive, in which instance then, besides the carbon content of the alloy in percents, also the cross section of the parts to be treated has still to be considered, from which the carbon gets to the surface during the chroming.

As the observation of all these measures may cause difficulties under circumstances, the invention proposes, to prevent the influence of the carbon content of the articles to be treated and especially its moving to the surface, thereby that the parts to be subsequently chromed are made of so called alloyed steels.

It has now shown, that not all of the known and even the best known alloying elements are not in position to check the moving of the carbon at the chroming. This carbon movement could not be prevented, for instance, even at the chroming of a fundamental substance with 0.1% and less carbon and additional 2% of molybdenum. This inconvenience was even then not overcome, if to the iron carbon alloys to be chromed such addition of chromium was added from the beginning that the carbon content of the alloys had to be considered as bound off thereon. Also in a steel with 0.1% carbon and 3% chromium the carbon moved for instance in the cross section of the fundamental material in opposition to the diffunding-in chromium, so that also in this instance chromium zones with unsatisfactory physical and chemical properties were obtained as result.

It has now been found surprisingly, that the moving of the carbon and thereby the inconvenience thereof can be prevented, if the articles to be chromed are made of an iron carbon alloy, which contains in the base material chromium together with other alloying elements, which alone or at least in these percentages have no effect. An addition of 3% chromium alone to a steel with 0.06% carbon can not stop the carbon movement in the base material. The same is valid for a steel which besides 0.06% carbon and other iron companions, contains alone 0.5% vanadium. By the simultaneous addition of chromium 3% and vanadium 0.5% to the steel, the movement of the carbon is practically absolutely prevented and thereby a chromed surface is produced, which can withstand the highest physical and chemical stressings.

Besides chromium and vanadium the steels, from which articles with perfect chromium layers have to be produced according to the invention, may further contain 0.3 to 3% of molybdenum, which has to be fully or partly replaced by tungsten. A steel with carbon 0.12%, chromium 1.2%, molybdenum 1.2% and vanadium 0.6% could be chromed especially well.

Consequently, the invention relates to a process for the production of articles of iron and steel with corrosion-proof surface by diffunding-in of chromium into the surface at temperatures from about 900 to 1100°, according to which the articles to be chromed are made from alloys of the iron, which contains less than 0.2% carbon (preferably 3 to 4% chromium), 0.3 to 3% of vanadium (preferably 0.5 to 1.5% of vanadium), remainder iron and the usual companions, and the articles consisting of these alloys are then chromed. Besides chromium and vanadium the steels may further contain 0.3% to 3% molybdenum, the content in chromium amounting then practically to from 0.5 to 5% (preferably 1 to 2%) and the content of vanadium again to 0.3 to 3% (preferably 0.5 to 1%). Tungsten has to be substituted completely or partly for the molybdenum in the alloy.

A silicium content in these materials has no decisive influence upon the physical and chemical property of the zones, but facilitates in quantities from 1 to 2% the diffunding-in of the chromium to a certain degree.

GOTTFRIED BECKER.
KARL DAEVES.
FRITZ STEINBERG.

Published May 11, 1943 Serial No. 421,399

ALIEN PROPERTY CUSTODIAN

METHOD OF AND AN APPARATUS FOR DRYING AND HARDENING IMPREGNATED ARTIFICIAL SAUSAGE SKINS

Julius Wolff, Amstenrade, Holland; vested in the Alien Property Custodian

Application filed December 2, 1941

The present invention relates to a method of and an apparatus for drying and hardening impregnated artificial sausage skins. More particularly the invention is concerned with a method of and an apparatus for simultaneously drying and hardening or previously hardening respectively by blowing in of air impregnated artificial sausage skins open at both ends and preferably provided with a fabric insertion or core.

According to the invention previously heated air is blown into one end of the impregnated tubular artificial sausage skins and may escape again at the other end. Said air previously being loaded with vapors of acetic acid, formaldehyde or other substances which are adapted to harden or to initiate hardening of the impregnating mass with which the tubular sausage skins are coated.

It is known per se to dry artificial sausage skins with air and also to use formaldehyde, for instance in the form of vapor, for hardening and initiating hardening respectively of the impregnating mass. The simultaneous drying and initiating hardening by means of hot air loaded with vapors of formaldehyde or similar hardening substance, however, has proved to be new and of particular advantage, because with this combined use the two effects occurring assist each other mutually. The movement of the air continuously carries fresh hardening vapors to the impregnated upper surfaces and removes them again after they have acted. The heating shortens the period of hardening or of initiating hardening respectively and the dilution of the vapors with hot air accelerates the reaction and prevents a loading with too large an amount of hardening means which would require to be removed again later on.

The novel combined method is carried out for instance in such a manner that the heated air is passed through a closed tank containing the liquid or other substance in consideration so as to absorb the vapors developed in the tank and to carry them into the artificial sausage skins to be dried or hardened respectively.

To be able to simultaneously dry and initiate hardening of a larger number of artificial sausage skins in this manner a distributing member may be provided in the pipe carrying hot air in rear of the tank in which the vapors are developed. From this distributing member a larger number of connecting hoses lead to the individual artificial sausage skins. Preferably the artificial sausage skins are freely suspended in their total length in the room of manufacture and provided at the lower end with a closure disc connected in the interior and provided with a passage to which a short pipe is connected to introduce the previously treated hot air.

In the accompanying drawing one construction of a device for carrying out the new method is diagrammatically shown by way of example.

In this drawing:

Fig. 1 shows the general arrangement,

Figs. 2 and 3 illustrate a distributing member in front and side elevation respectively, and

Fig. 4 shows a distributing arrangement.

The heated drying air is supplied by a pipe *a* and enters the tank *b* in which the vapors are developed and which is filled with a liquid *c* the level of which reaches as far as beneath the inlet opening. In the same level the discharge opening is provided to the branch pipe of which the air pipe *d* is connected which leads to the artificial tubular sausage skin *e* to be dried and hardened. To this purpose the lower end of the artificial sausage skin *e* is provided with an annular disc *f* through the centre opening of which air may flow in. At the upper end of the artificial sausage skin a disc of same construction is provided by way of the opening of which the air may escape again. The tank *c* may be re-filled by way of an opening *g* provided in the upper wall and adapted to be closed by a plug.

The distributing member consists of a chamber *h* enlarging in the manner of a funnel at the smaller end *i* of which the previously treated air is introduced, whereas at the enlarged end a number of short pipes *k* is provided which by means of hoses are connected to the individual artificial sausage skins. The chamber *h* may either be flat and provided with a small number of short connecting pipes or may be formed in the manner of a truncated cone to receive a corresponding larger number of short connecting pipes. In each hose or short connecting pipe a closure member may be provided so that, when these hoses are connected to fresh artificial sausage skins no air not yet utilized may escape.

For distributing the air upon a number of artificial sausage skins suspended side by side, distributing pipes *m* provided with corresponding branches *n* may be used, as shown in Fig. 4.

Depending on the suspension of the artificial sausage skins in rows or groups the device may eventually be constructed in another manner.

JULIUS WOLFF.

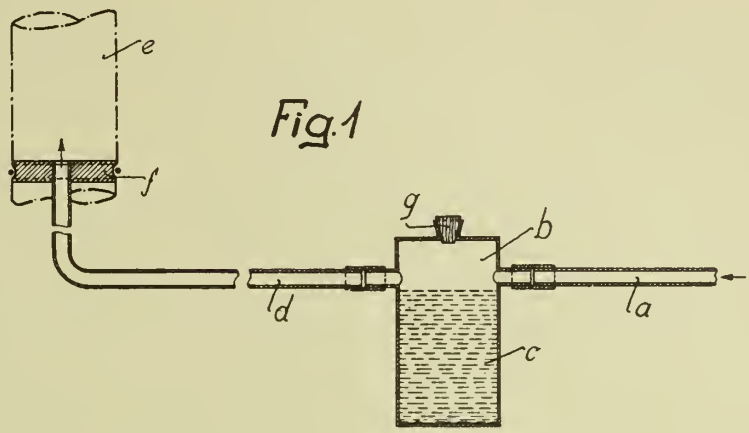
PUBLISHED MAY 11, 1943. BY A. P. C.

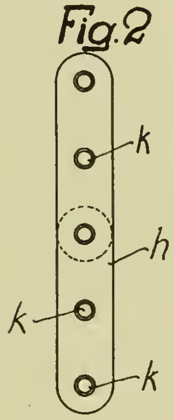
J. WOLFF

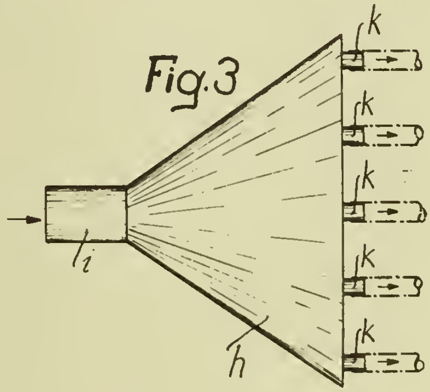
METHOD OF AND AN APPARATUS FOR DRYING AND HARDENING IMPREGNATED ARTIFICIAL SAUSAGE SKINS

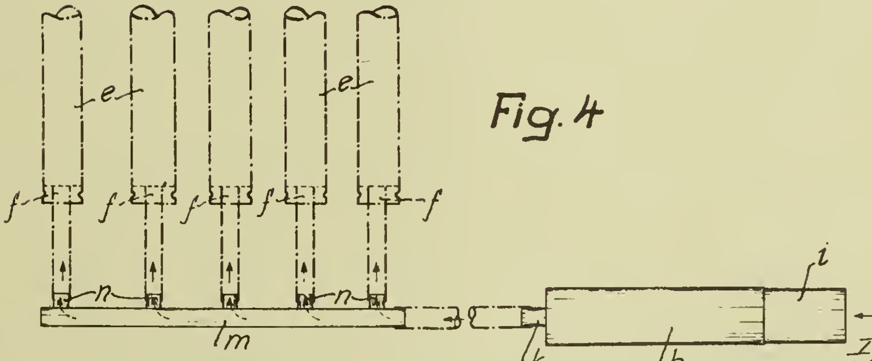
Filed Dec. 2, 1941

Serial No. 421,399









Inventor,
J. Wolff

By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 422,672

ALIEN PROPERTY CUSTODIAN

SEWING MACHINE

Werner Kurt Rudolf Beyer, Dresden, Germany; vested in the Alien Property Custodian

Application filed December 12, 1941

This present invention refers to household sewing machines and more especially to zig-zag-sewing machines.

The width of the stitches in zig-zag-sewing machines is effected by the moving of a slide to and fro in a stationary track for this slide or by the reverse action that is: the slide is stationary and the track for the slide is moved. From the nonstationary part of the mechanism described a connecting rod leads to peg for the purpose of adjustment, which peg usually sticks out from the front of the head of the sewing machine and which is moved there to conform to a scale of the several widths of the stitches.

In order not to have to hunt after each individual change of the widths of the stitches for an adjustment which is used repeatedly, set screws have been used for the purpose of limting the extent of the motion of the stop-peg. Such a limitation however fixes two widths of the stitch only. For instance: one setscrew serving as stop for the movement of the slide can be adjusted so that the slide comes to stop at $\frac{3}{16}$ inch, while the second setscrew serving as stop can be adjusted so that the slide comes to stop at the point of $\frac{1}{16}$ inch on the scale. These two widths of stitches fixed by the setscrews can be found so to say "blindly" during the operation of the machine, that is without glancing at the scale. If however other widths of the stitches are desired than the ones which are established by the setscrews and which lie between and within the widths of the stitches as established by the setscrews, then it is necessary to find the new place on the scale for the position of the stop-peg. If however widths of the stitches are desired which are beyond the limits of the widths of the stitches as established by the setscrews, that is: widths which lie either above or below the set limits of the setscrews, then it is necessary to screw the setscrews back so that the desired adjustment on the scale can be made. For many performances of the machine it is necessary to be able to have adjusted more than only two widths of stitches in constant change with one another and this fact developed the necessity to be able to install additional adjustments without changing the previously fixed position of the setscrews.

A well known solution of this task proposes to move the stop-peg beyond the reach of the setscrews. By a change of the stop-peg relative to the setscrews the stop-peg must be temporarily removed from the realm of mutual activity of the setscrews or from within the limits of the setscrews, or on the other hand the setscrews must be brought out of the active and effective position into an inactive and ineffective position so that also thereby the realm of the mutual influence is destroyed by the change of position relative to each other, i. e. of stop-peg and setscrews.

In order to carry out this solution in actual practice the stop-peg is provided in this well known device with an adjustable slide which, when in active use, is stopped by the setscrews, and which however can be moved from the realm of activity of the setscrews in order to make possible a complete freedom of motion for the stop-peg along the entire scale.

This device however cannot be serviced easily in every position of adjustment. When for instance the stop-peg has been removed from the realm of influence of the setscrews and shall then again be brought back to its position as before the removal, then it is necessary to move the stop-peg first again in a position which enables it to reestablish the mutual influence between the adjustable slide of the stop-peg and setscrews. This position must be hunted up or at least it must be felt for by repeated trying. A complete mechanical act, a "blind" finding is not possible.

To explain more fully the action of this well known device according to the above described example: In order to bring back again within the realm of the setscrews the slide upon the stop-peg, it is necessary to bring the stop-peg first into a position which makes it possible that the slide can be pushed again between the setscrews. If the stop-peg is not as yet in that particular position, then the slide will strike against the setscrews and can therefore not slide between the setscrews.

This present invention brings a further solution of the well known task to effect more than two adjustments of the stop-peg on the scale without having to touch the adjusted setscrews; an act whereby the realm of mutual influence between stop-peg and setscrews is not changed by the change of the relative position. This is effected through the fact that an additional adjustment of the width of the zig-zag-stitches is obtained besides the one which was obtained by the change of position of the stop-peg between the limits established by the setscrews. This additional adjustment is obtained by means of an interior structure of an adjustment device added to the set of connecting rods between the stop-peg and the slide.

For the purpose of the easiest and most simple servicing of this device it is of advantage that the

additional adjustment device, which is effected through an interior structure, can be adjusted likewise by means of the stop-peg which is movable within the realm of the setscrews.

A practical arrangement of this invention is marked by the fact that the set of connecting rods, found between the stop-peg and the slide, consist of a rod connected with the movable part of the slide and of a crank connected with the stop-peg, which rod and crank are movably connected with each other and which when held in rigidly extended position influence the movable part of the slide by moving the stop-peg between the adjusted limits, established by the setscrews, and which however by turning the stop-peg will be brought in a the rigidly extended position and thereby cause an additional motion of the movable part of the slide.

The stretched, rigidly extended position of the connecting rod and crank can be secured by an endstop mounted on the stop-peg which endstop limits the turning of the stop-peg.

The drawings will explain the object of the invention on the hand of a practical example. The drawings show in

Fig. 1 a transverse section of the head of a sewing machine with the device according to the invention with crank and connecting rod lying in stretched, rigidly extended position,

Figs. 2, 3, 4 schemes of the function of the device,

Fig. 5 a perspective view of the essential part in the head of a sewing machine showing among others the interior structure according to the invention,

Fig. 6 an ornamental stitching,

Fig. 7 a completed button hole.

In the arm of the sewing machine is the mainshaft 1 which reaches in a wellknown way into the head 2 of the sewing machine and on which are mounted the means necessary for the transfer of the motion upon the mechanism built in the head. The motion necessary for swinging to and fro of the needlebar is transferred in the practical example by 2 screw-wheels 3 and 4 upon the cylinder 5 which revolves around the axle 5*a* which is situated in the interior of the machine head. Upon the cylinder 5 is a cam 6 which is surrounded by a fork 7. This fork 7 is mounted upon a bolt 8 which is situated in the wall of the machine. From a lateral projection 7*a* of the fork 7 a bolt 9 reaches between a fork 10 which is mounted on an arm 11 of the wellknown movable needlebar guide. Upon the bolt 9 is a cylindrical slide 12 which reaches between the ends of the fork 10. This slide 12 is movably connected with a rod 13 which in turn is movably connected with a crank 14. This crank 14 is fastened rigidly to a bolt 15 which reaches through the stop-peg 16 and which shows at its front end a knob 17. The stop-peg 16 is movable on a scale 18 fastened to the front wall of the machine and this up and down motion is limited by two setscrews 19 and 20. A small projection 21 at the knob 17 of the bolt 15 which drops into a notch 22 of the stop-peg 16 enables the turning of the bolt 15 to stop, when the connecting rod 13 and the crank 14 were situated in rigidly extended position. The method of action of the device is the following: As mentioned above the motion of the main shaft 1 situated in the sewing machine head is transferred by means of the two screw-wheels 3 and 4 upon the cylinder 5 situated in the head. The cam 6 which is mounted firmly upon the cylinder 5 conways by its rotary motion to the first fork 7 a swinging motion around its pivot 8. The bolt 9 situated in the lateral projection 7*a* of the fork 7 receives thus likewise a swinging motion which the bolt 9 executes between the ends of the second fork 10 fastened to the needlebar guide 11. By means of the slide 12 which is mounted movably upon the bolt 9 situated upon the lateral projection 7*a* of the fork 7 the swinging motion of the bolt 9 is transferred upon the second fork 10 mounted on the arm 11 of the needlebar guide from whence this motion is transferred in its turn upon the movable needlebar housed in the head of the machine.

This transfer of turning motion of the bolt 9 situated in the first fork 7 upon the needlebar is effected only when the axis of the slide 12 stands in the axis of the bolt 8 of this first turnable fork 7. In this position the cylindrical slide 12 undergoes a turning motion, but around its own axis, it does not effect the second fork 10 on the arm 11 of the needlebar guide. If however the slide 12 is pushed out of this coaxial position further toward the free end of the bolt 9 which is situated between the prongs of the second fork 10, then the slide transfers the swinging motion of the bolt 9 in as much greater measure upon the second fork 10 and thereby upon the arm 11 of the needlebar guide as the slide is pushed away from the axis of the first fork.

This shifting is caused by the stop-peg 16 situated on the front of the machine head. The connection to the stop-peg 16 is effected by means of the connecting rod 13 movably mounted on the slide 12 and by means of the crank 14 situated on the bolt 15 which is inside the stop-peg 16. When these connecting links 13 and 14 are in a rigidly extended, stretched position and when these connecting links are secured in this rigid position, then it works so to say as a firm connection between slide 12 and bolt 15 inside the stop-peg 16. The stop-peg 16 is moved on the scale 18 indicating the widths of stitches to the desired width and this shifting is transferred immediately upon the slide when the connecting rod 13 and crank 14 are in rigidly extended position. The limitation of the shifting of the stop-peg 16 on the scale 18 is done thereby by means of the setscrews 19 and 20 situated at the front wall of the head of the machine. To adhere to the example of operation mentioned in the introduction, the lower setscrew 20 can be adjusted so that the stop-peg touches against the setscrew at $\frac{3}{16}$ inch of width of stitch and the upper setscrew 19 can be adjusted so that the stop-peg touches the setscrew at $\frac{1}{16}$ inch of width of stitch. In such an adjustment the width of stitches can be changed "blindly" that is by touch only between $\frac{3}{16}$ and $\frac{1}{16}$ inch, a fact, which has been known for a long time.

If it is desired to work with a width of stitches narrower than the one adjusted by the setscrew 19 then this is done by turning the knob of the stop-peg 16. This knob 17, which forms one unit with the bolt 15 situated in the interior of the stop-peg 16 and with the crank 14 fastened to this bolt 15, swings during its turning motion the crank 14 and draws along thereby the rod 13 movably connected therewith, which rod 13 in turn is connected with the slide 12. According to the amount of the turning of the knob 17 the slide 12 situated upon the bolt 9 moves upward. Thus the distance of the to and fro swinging motion of the needle is lessened. It is

therefore possible to leave the stop-peg in its position, that is: touching the lower setscrew **20** and it is necessary only to turn the knob **17** in order to diminish the distance of the to and fro swinging motion of the needle. By correspondingly turning back the knob **17** up to the rigidly extended position of the connecting links, a motion limited by touching the notch **22** and the small projection **21** of the revolving knob **17**, the original position shown in Fig. 1 is instantly reestablished. The turning of the knob **17** can be done in any position at all of the stop-peg **16**.

In Fig. 1 the stop-peg **16** is in touch with the upper setscrew **19**. This corresponds with Fig. 3. In Fig. 4 however is shown a position of the slide **12** which is reached by turning the knob **17**. Here the slide **12** is in its coaxial position with the axis of the first fork **7**. When the knob **17** is turned so far that the slide **12** comes to stand in this coaxial position with the axis of the first swinging fork **7**, then the width of to and fro motion of the needlebar is "zero." Such an adjustment can be made completely "blind," that is: by touch only, without removing thereby the stop-peg **16** out of the realm of influence limited by the setscrews.

A change between a maximum size, a medium size and the adjustment "zero" of the width of the stitches is often used in sewing, be it for the purpose of doing special "zig-zag" ornamental sewing which changes continuously between a zig-zag seam of two different widths of stitches and plain stitches as is demonstrated in Fig. 6, or be it for the working of button holes, as is shown in Fig. 7. In the zig-zag stitch for ornamental sewing as is shown in Fig. 6 the adjustment of the width of the zigzag-stitch has for instance the following always recurring sizes:

$$\tfrac{3}{16}—0—\tfrac{1}{16}—0—\tfrac{3}{16}—0—\tfrac{1}{16}—0—\tfrac{3}{16}—0$$

etc. Therefore the setscrews are adjusted so that the lower setscrew **20** stops the stop-peg at $\frac{3}{16}$ of an inch and the upper setscrew **19** stops the stop-peg at $\frac{1}{16}$ inch. In order to make such a seam one begins the sewing with an adjustment of the stop-peg in the lowest position of touch, that is, in the position where the stop-peg touches the lower setscrew **20**. After finishing the $\frac{3}{16}$ inch wide zig-zag-stitches the knob **17** is turned until one feels the touch of the small projection **21** against the notch **22**. Since the slide **12** stands now in a coaxial position with the axis of the first fork **7**, the needlebar makes no to or fro motion, in other words, it sews plain stitches. After finishing these plain stitches the knob **17** is turned in the opposite direction back to its boundary limit, which can be felt, thus establishing the rigidly extended position of the connecting links and then the stop-peg is shifted against the upper setscrew **19** and comes there to rest. Now the needlebar swings to and fro a distance of $\frac{3}{16}$ inch. After finishing these $\frac{3}{16}$ inch wide zig-zag-stitches the knob **17** is turned again so far that one feels the touching of the boundary limit as described above, which again corresponds to the coaxial position of the slide **12** with the axis of the first fork **7**, that is, until it sews without to and fro motion of the needlebar a seam sewn in "zero" that is: plain stitches. If it is now desired to sew again a $\frac{3}{16}$ inch wide zig-zag stitch one turns back the knob **17** so far that one feels the boundary limit of the rigidly extended position of the connecting links, and shifts at the same time the stop-peg again against the lower set screw **20**. That is the same position from which the start has been made in the example here cited. This is repeated during the further sewing. The sewing of a buttonhole according to Fig. 7 can be done in the following manner: one begins to sew the edge **23** of the one side of the buttonhole from a point I with an adjustment of $\frac{3}{16}$ inch width of stitches, that is, the stop-peg is in touch with the upper setscrew **19** and the connecting links between stop-peg and slide are in rigidly extended position. This edge is finished to point II, then one moves the stop-peg down to the lower setscrew **20** retaining the rigidly extended position of the connecting rods, and the one end **24** of the buttonhole is sewed with a width of $\frac{3}{16}$ inch stitching; after finishing this end **24** one moves the stop-peg against the upper setscrew **19** again by maintaining the rigidly extended position of the connecting links. The second edge **25** of the other side of the buttonhole is then sewed with a $\frac{1}{16}$ inch wide zig-zag stitch from III—IV. After finishing this edge the stop-peg is again moved until it touches the lower setscrew **20** again retaining the rigidly extended position of the connecting links, and now the other end **26** of the buttonhole is closed with stitches $\frac{3}{16}$ inch wide. After finishing this end **26** one turns the knob **17** so far that one feels its boundary limit, that is, until a coaxial position has been established between the slide **12** and the axis of the bolt **8** of the first fork **7**, and now, the thread is made "fast" by plain stitch **27**. When the next buttonhole is to be started one turns back the knob **17** again until the rigidly extended position of the connecting links has been established and the stop-peg is pushed against the upper setscrew **19**. In Figs. 2 to 4 schemes of the processes which take place in the interior of the head during the execution of these two sewing examples are again represented. Fig. 2 corresponds to the adjustment of the stop-peg, when the stop-peg touches the lower set-screw **20**. The width of the stitches here, is for instance, $\frac{3}{16}$ inch. From this position the stop-peg is pushed upward for the distance x so that it touches the upper setscrew **19** retaining thereby always the rigidly extended position of the connecting links. This is shown in Fig. 3. Now the width of the stitch is to be $\frac{1}{16}$ inch. By turning the knob **17** the crank **14** connected with the bolt **15** and knob **17** is swung at an angle α. This corresponds to the to and fro motion of the needlebar "zero" therefore plain stitches are sewed. The above described examples of sewing can be executed completely "blind," that is by touch only, because each and every position used in them is limited by stops which can be felt. When besides these limits, which can be felt, other limits of widths of stitches are to be installed, they can be installed by means of a small indicator—not shown in the drawing, which is mounted upon the knob **17** and which works according to a scale not shown in this drawing on the stop-peg **16**. It is necessary to observe that the desired width of the stitches is the difference between the width of the stitch indicated on the main scale **18** and the width of the stitch indicated on the scale on the stop-peg. A third adjustable stop besides the two already present in the shape of the setscrews can be mounted in the stop-peg **16**, against which stop the above mentioned indicator or some other projection of the knob **17** strikes and limits thereby the turning of the knob **17**. This arrangement is of special advantage when it is not desired to fall

back upon plain stitches corresponding to the "zero" position, but when the width of the stitch is to be greater than "zero."

It must be understood that in the drawings only those parts of the construction are designated by number which are essential to clarify my invention. Other parts which are not so designated in the drawing and in the by-following description can be seen in my pending application, serial number ——— of ———.

In this description I have explained only one practical construction of the device, but it must be understood that my invention may be embodied in other form and on other sewing machines: in other word the thought of the invention counts above its individual construction.

WERNER KURT RUDOLF BEYER.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

W. K. R. BEYER

SEWING MACHINE

Filed Dec. 12, 1941

Serial No.

422,672

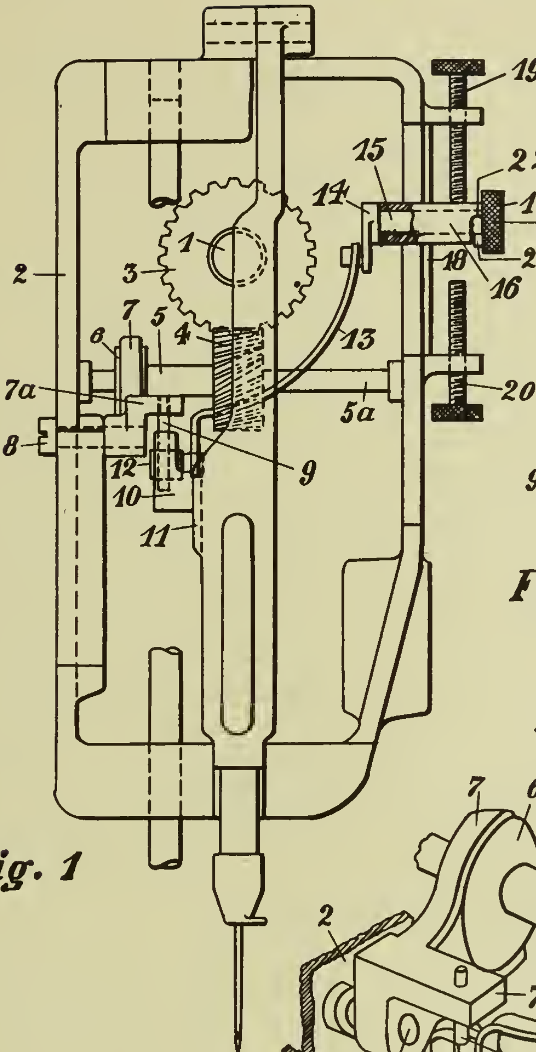


Fig. 1

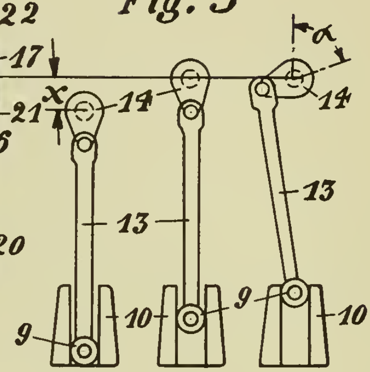


Fig. 3

Fig. 2

Fig. 4

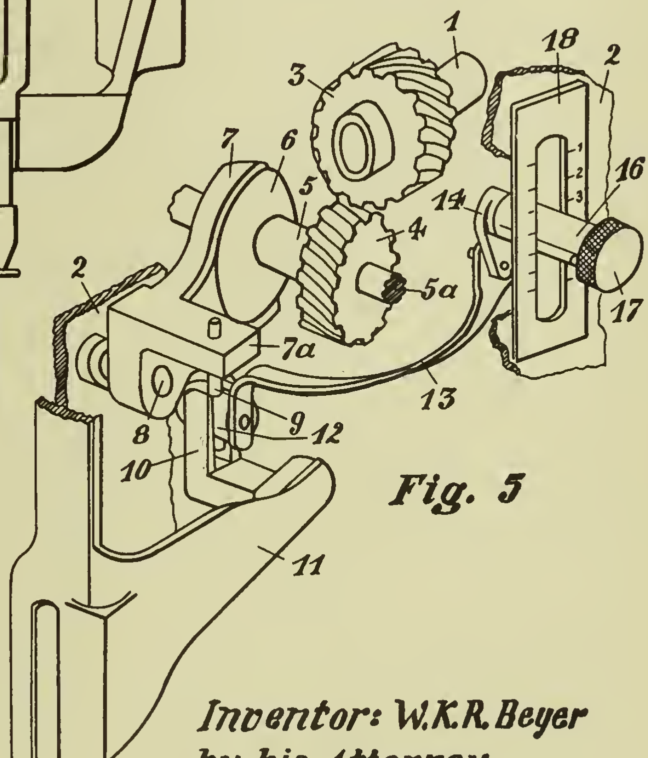


Fig. 5

Fig. 6

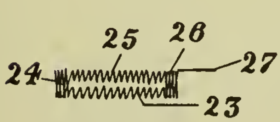


Fig. 7

Inventor: W.K.R. Beyer

by his Attorney

Published May 11, 1943 Serial No. 422,843

ALIEN PROPERTY CUSTODIAN

INJECTION MEANS FOR INTERNAL COMBUSTION ENGINES

Attilio Carlin, Trento-Pergine, Italy; vested in the Alien Property Custodian

Application filed December 13, 1941

The present invention relates to an improved type of two- or four-stroke internal combustion engine, operable with any sort of fuel in the form of either gas, or mist or solid suspension in the air or gas, either separately or in combination.

More particularly the present invention relates to a device for injecting air or fuel or both into the driving cylinder.

Said device comprises, in combination with the driving cylinder, a smaller cylinder, hereinafter called the injecting cylinder, which is integral with the driving cylinder and in which an injecting piston is reciprocated.

The injecting cylinder is provided with a suction or inlet aperture and an injection aperture, the latter being provided with a valve closed by a spring or other adjustable resilient means and capable of opening when the pressure of the piston in the injecting cylinder exceeds a determined limit, so that the fluid of any kind desired is injected under the wanted pressure in the combustion chamber of the driving cylinder. Said fluid may consist either of air, or gas fuel or a mixture thereof; or else it may consist of a finely subdivided suspension of a liquid or solid fuel in a gas.

Injection may take place either in the combustion chamber of the driving cylinder or in a pre-combustion chamber, either directly or indirectly; means to improve evenness of the mixture may be provided, if desired, for instance by giving a suitable shape to the valve head or the valve seat or adding downstream of the same other distributing or mixing or whirling organs; moreover, if desired, means for heating the fluid or mixture fed from the valve, such as electric heaters, may be added. The inlet aperture may be provided of a regulating valve, e. g. a butterfly throttle. Injection may be regulated by adjusting or varying the stroke of the injecting piston or anyhow varying the volume of fluid urged at every stroke by the same and adjusting the phase of the injecting piston stroke in relation to the driving piston stroke, that is the advanced ignition.

The injection pressure is determined by registering the resilient means which counteracts the opening of the ignition valve.

The injection valve may be assisted or controlled in its operation by mechanic or elastic or magnetic or other means.

It is a characteristic of the present invention the fact that the injection piston is always so shaped as to reduce the clearance, for instance by exactly fitting against the stem or the head of the valve matching its shape.

In order to give a more complete illustration of the invention, two particular embodiments of the same are described hereunder, being it understood that they are given as examples only, and not as limitations of the invention, many other embodiments being possible with different mutual arrangements of the driving cylinder, injecting cylinder and valve.

Said two embodiments are diagrammatically represented in the attached drawing, wherein:

Fig. 1 is a sectional view of a device according to the invention;

Fig. 2 is a section through line A—A of Fig. 1;

Fig. 3 is a section through line B—B of Fig. 2;

Fig. 4 is a sectional view of a different embodiment of the device acording to the invention with reference to Fig. 1.

The driving cylinder 1 containing the driving piston 2 is integral, in correspondence to its head, with a smaller cylinder 3, which will be called hereinafter the injecting cylinder; in this cylinder a piston 4 is directly actuated by a cam or other means, for instance from the driving shaft or other shaft connected with the driving shaft by means of a connecting rod 5 pivoted in 6 on the piston. A passage is provided between the driving cylinder and the injecting cylinder, in which passage is placed a preferably conical wall 7, urged in the closed position by a spring 8 held by nuts 9 and protected by a cap 10.

The injecting cylinder 3 is provided also with an inlet conduit 11 with a throttle 12. This conduit is uncovered by piston 4 at the end of its intake stroke which extends to the dotted line 13, this conduit leading the fluid or the fluid mixture to be injected.

The head of the injecting piston is shaped with a cavity 14, so as to match with an extremely small gap the shape of the wall 7 and to reduce the volume of the noxious space. This detail can be seen more clearly in Figures 2 and 3.

In the modification of Fig. 4 the cylinder 3 is parallel to driving cylinder 1 and the injecting piston 4 bears an extension 15 penetrating into the passage between the injecting cylinder and the seat of wall 7, which in this case is arranged with a direction inclined to the center lines of the two cylinders.

The above embodiments are given for example purposes only and many modifications can be introduced in the device according to invention as to the type of the engine which can be a 2-

or 4-stroke engine, with either electric or spontaneous ignition, and can operate with either gaseous or liquid or solid fuels of any kind, or as to the shape and dimensions of the injecting cylinder and piston, the number of cylinders and relative drive and regulation mechanism, and the shape and dimensions of the injection wall, or as to the coupling of the injection unit with the driving cylinder and the relative arrangement of the various parts, or else as to all the other modifications and improvements which may be introduced or added in the single cases according to circumstances.

ATTILIO CARLIN.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. CARLIN
INJECTION MEANS FOR INTERNAL
COMBUSTION ENGINES
Filed Dec. 13, 1941

Serial No.
422,843

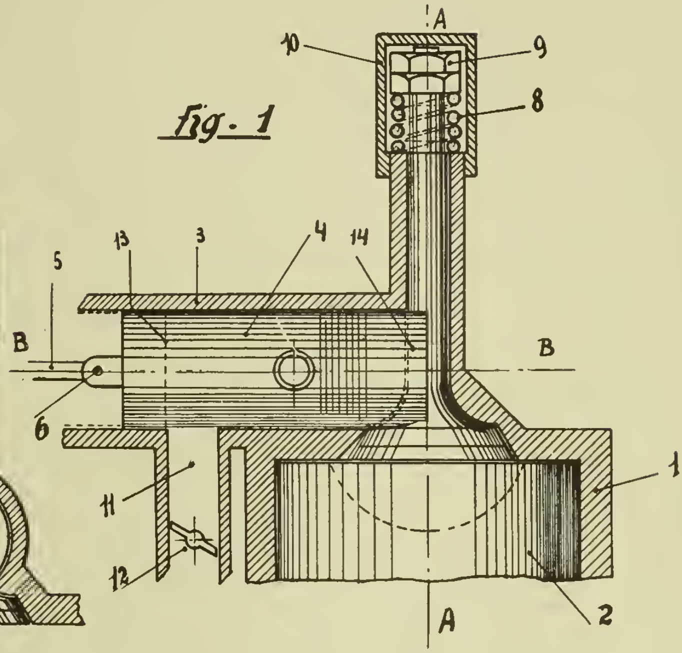


Fig. 1

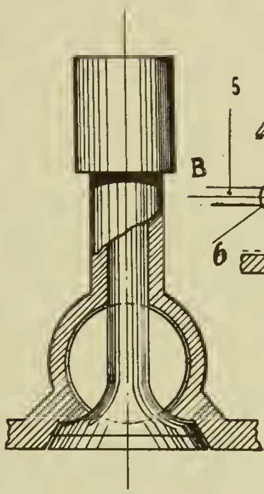


Fig. 2

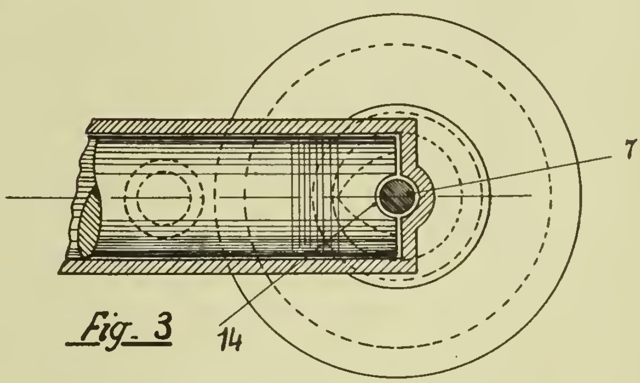


Fig. 3

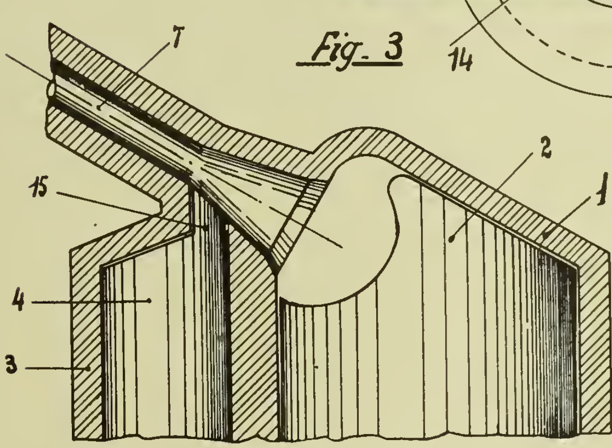


Fig. 4

INVENTOR:
ATTILIO CARLIN
BY Haseltine, Lake & Co.
ATTORNEYS

Published May 11, 1943 Serial No. 423,037

ALIEN PROPERTY CUSTODIAN

DECOLORIZING AND REFINING AGENT FOR GLASS

Hans Kohl, Frankfurt A. M., Germany; vested in the Alien Property Custodian

No Drawing. Application filed December 15, 1941

In the glass melting process it has proved very difficult to remove the residual reaction blisters from the molten glass by a thermic treatment only. This is the reason why a so-called refining agent is added to the glass batch or the already molten glass whereby in general arsenic compounds have been employed. Now the raw materials used in the glass melt are not as free from iron as it is needed to obtain an absolutely white, i. e. colorless glass, which necessitates a decolorization of the molten glass.

In the chemical decolorization process oxygen evolving substances are used whereby the green coloring ferro iron is oxidized to the yellow coloring ferric iron. The other method to decolorize glass is a physical one using the effect of the complementary color. In this case coloring metal oxides, for instance, nickel, cobalt, manganese and the like are principally employed.

Now it was found that glass fluxes may be refined and at the same time decolorized if alkali-meta-antimoniates are added to the batch. Excellent results have been obtained by the utilization of alkali-meta-antimoniates containing hydrate water (water of crystallization).

The new agents for decolorization and refining may be employed either in a pure state or in mixture with other known decolorizing and refining materials.

The alkali-meta-antimoniates are distinguished by an excellent refining and at the same time decolorizing effect. Surprisingly enough these effects have also been observed in lead (crystal) glass.

HANS KOHL.

ALIEN PROPERTY CUSTODIAN

CONTAINER FOR A RAZOR WITH STROPPING DEVICE

Max Schmidt, Berlin-Wilmersdorf, Germany; vested in the Alien Property Custodian

Application filed December 22, 1941

Containers for safety razors are known which are composed of two cup-shaped parts hingedly connected at one end, one part adapted to be folded over the other part, and in which the top part has a cavity formed of pressable material suitable for stropping.

These containers of known type have the inconvenience that they easily get dirty as they are freely exposed and open and consequently soon become useless by damages and dirt.

Box-shaped containers have also become known in which an oval aperture is provided in one end face of the box parts, and this aperture is covered by a not rigid, bendable, step-like insert or flap in the lid. By pressing the flap inwards the interior of the container is accessible.

The container according to the invention differs from the containers of known type in that the stropping cavity is provided on the inner side of the lid. The stropping cavity is formed by a curved wall near the hingedly connected end of the cover and by a similarly curved wall inwardly extending from the inner side of the lid.

The stropping cavity is dust-tightly covered when the lid of the container is closed.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which

Fig. 1 shows the opened container in top plan view,

Fig. 2 is a part section on line II—II of Fig. 3,

Fig. 3 is a part section on line III—III of Fig. 2,

Fig. 4 shows in longitudinal section on line IV—IV of Fig. 1 the container in open state, the lid in section and without the razor.

The container according to the invention consists of a cup-like bottom part 2 and of a cup-like cover part or lid 1, these parts being connected by a hinge 4. The razor is placed in the bottom part 2.

The lid 1 is made of a pressable material suitable for stropping.

According to the invention the stropping device for the razor blade is provided on the inner side of the lid and is thus dust-tightly covered when the container is closed.

The part which forms the stropping device consists of a curved extension 3 which extends from the middle of the lid 1 and subdivides the lid into two compartments 6 and 7. The stropping device proper is formed on the one hand by the curved extension 3 and on the other hand by the inner surface of the part of lid 1.

The lid 1 is open at one side so that the blade of a razor can be inserted into the stropping cavity when the lid is opened, i. e. laid over from the bottom part. The bottom part 2 has an upwardly extending wall 2*a* at the side corresponding to the open side of the lid 1 so that, when this lid 1 is in the closed position, the container is completely closed. A snap lock 5, 5*a* at the outer ends of lid 1 and bottom part 2 serve to securely hold the lid on the bottom part.

MAX SCHMIDT.

PUBLISHED | M. SCHMIDT | Serial No.
MAY 11, 1943. | CONTAINER FOR A RAZOR WITH STROPPING DEVICE | 424,071
BY A. P. C. | Filed Dec. 22, 1941

Fig.1

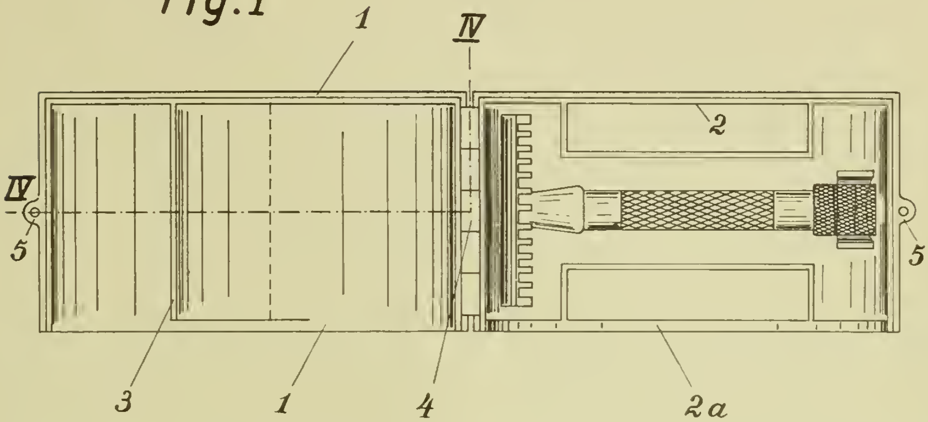


Fig. 2

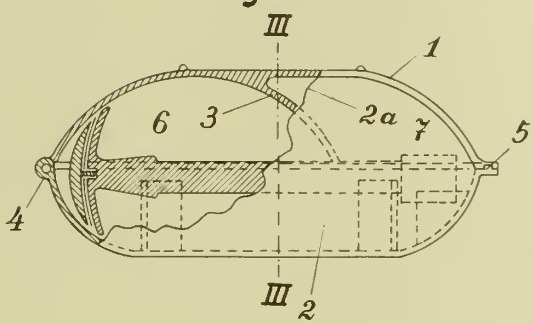


Fig. 3

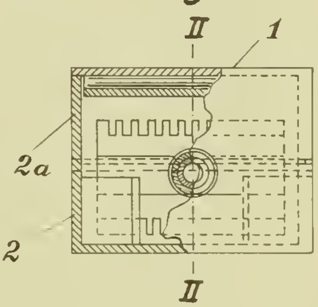
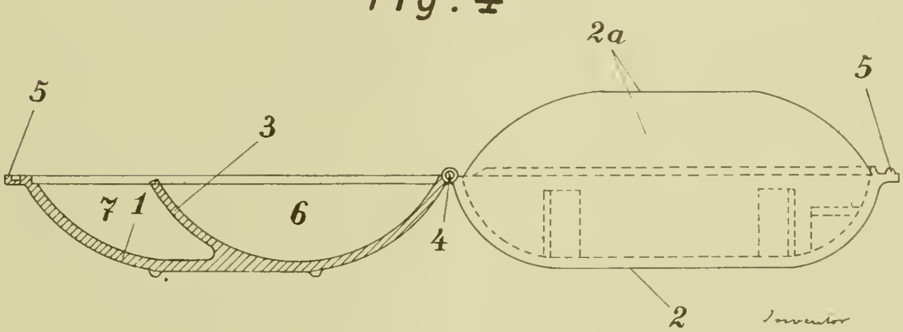


Fig. 4



Published May 11, 1943

Serial No. 424,624

ALIEN PROPERTY CUSTODIAN

PROCESS FOR MAKING TENNIS BALLS

Léon Sylvain Max Lejeune, Paris, France; vested in the Alien Property Custodian

Application filed December 27, 1941

The present application relates to the manufacture of tennis balls and is a continuation-in-part of my prior application Serial No. 250,617 filed on January 12, 1939.

The object of my invention is a process for making tennis balls complying with the conditions prescribed by the International Lawn-Tennis Federation as regards balls used in international tennis matches. As known these conditions consist in maximum and minimum limits for the diameter of the ball, its weight, its rebounding height for a given height of fall and its degree of compression under a predetermined stress applied during a given time. Such balls are a fortiori suitable for training for such matches, and all the more so for the use of ordinary players.

Another object of the invention is a process which permits to obtain tennis balls which are not liable to let out their air after a more or less long period of time.

Still another object of the invention is a process which permits to obtain tennis balls which practically do not wear out.

A further object of the invention is a process for making tennis balls having a regular rebounding capacity which does not substantially vary with changes in temperature.

Still a further object of the invention is the manufacture of tennis balls the initial launching velocity of which can be very great and remains the same during the whole life of the balls.

Another object of the invention is the manufacture of tennis balls upon which the ground produces no damping or deadening effect (as has been observed with usual balls covered with felt) and the rise of which from the ground to the receiving racket can consequently be rapid.

Still another object of the invention is the manufacture of tennis balls which are sensitive neither to cold nor to heat or to moisture and the properties of which thus remain the same regardless of the weather.

Another object of the invention is the manufacture of tennis balls which can be washed.

Still a further object of the invention is a process which permits of making balls having the above mentioned properties under remarkable conditions of regularity and economy.

The tennis balls the manufacture of which forms the object of the invention comprise substantially a body filled with air substantially at atmospheric pressure, this body being formed of two hemispherical calottes united by vulcanized rubber and each of which is made of a balanced fabric impregnated with vulcanized rubber so as to form a homogeneous mass of textile elements impregnated throughout and firmly united by means of vulcanized rubber.

The fabric which is used for forming the hemispherical calottes can be composed of vegetal or animal fibres or threads. As above mentioned, this fabric must be a balanced fabric, i. e. a fabric in which the composition of the threads as well as their tension and degree of twisting are the same for the warp and the weft, so that the fabric is in equilibrium in all directions. Such a fabric can be made by having uniform weft and warp threads subjected to the same tension, or, if these conditions are not complied with, by superposing two or more layers of a fabric which are so arranged that the unevennesses of their weaving are mutually compensated. To this effect it is possible, for example, to use to advantage a cotton molton formed of a very fine and twisted warp and of a thick and very slightly twisted weft—or an equivalent fabric—and to superpose two pieces of such a molton so that the weft threads of the one are at 90° with respect to those of the other. Such a unit can be impregnated with rubber in a uniform manner and its elasticity is the same in all directions.

The body of the ball formed in the above mentioned manner is advantageously covered inwardly and outwardly with an impervious layer of vulcanized rubber and it is furthermore covered with a layer of canvas on the outer surface of which a layer of rubber, also vulcanized, is applied. This latter layer of rubber, which forms the outer surface of the ball, is provided with relief patterns adapted for regulating the velocity of the ball and ensuring the regularity of the direction it takes in the air.

The process of manufacture according to the invention essentially consists in impregnating a balanced fabric such as the above defined fabric with an aqueous emulsion or solution of natural, synthetic or regenerated rubber, in cutting out, in this impregnated fabric, pieces of suitable shape and in pressing them into hemispherical segments after coagulation but while the mass is still wet so as to expel a part of the coagulation water, in drying the hemispherical segments, after which two of these segments are united by sticking them together along their edges in order to form a ball by means of a rubber solution, after which the ball is covered with a coating formed of a fabric stuck through calendering to an external layer of non-vulcanized rubber, the

whole being then vulcanized in a mould the inside of which reproduces the external form which the finished ball must have.

The impregnation may be effected by any known means but so as to uniformly and regularly distribute the same weight of emulsion or of solution on an equal surface for a determined thickness.

The coagulation is also obtained by any known methods. The fabric is cut out and stamped in the form of spherical segments immediately after the coagulation, that is to say when the rubber is fixed in the fabric, but still surrounded by its coagulation water. In the course of the compression due to the stamping a part of this water is expelled, but a certain quantity of water remains therein which is removed by drying.

During this drying operation a deformation of the hemispherical calottes necessarily takes place. For this reason, in a manufacturing process requiring such a precision as that of a tennis ball, the drying is effected, according to the invention, on a hemispherical punch having exactly the form and the dimensions desired for the calotte. During the whole drying operation, the rim of the calotte is maintained on the hemispherical punch for instance by means of a ring which tightly holds down the rim of this calotte against the punch in order to avoid any irregular shrinking.

After the assembly of both hemispherical calottes, the spherical body thus obtained is covered with a layer of fabric stuck by calendering to vulcanized rubber and the whole is vulcanized in a mould the wall of which is provided with suitable asperities for giving to the outer surface of the ball the desired roughness in order to regulate the velocity in the air. It is advantageous, for this vulcanization, to introduce previously into the ball a substance capable of producing gases at the temperature of vulcanization in order to obtain during the vulcanization an inner pressure adapted to ensure a better application of the walls of the ball against the cavity of the mould and a more rapid vulcanization. After the vulcanization, the wall of the ball is perforated while the latter is still contained in the mould in order to balance its inner pressure with the pressure of the surrounding air, and then the so formed hole is stopped.

According to a preferred embodiment of the process according to the invention, the different above mentioned operations are effected in the following manner.

Cotton molton having a weight of preferably 450 to 500 grams per square meter is first treated so as to facilitate its impregnation with rubber of natural latex or regenerated or synthetical rubber, for example by previously dipping it in water to which a "wetting" agent has been added, after which this so prepared molton is impregnated with rubber of latex by being passed through a bath of concentrated latex, for example a latex containing 50% of rubber, the said bath containing the vulcanizing products, accelerators and other products usually used in the rubber industry. The fabric thus impregnated is then freed, by a slight pressure, from the excess latex which it may have absorbed and is coagulated, for instance by passing it through a bath of diluted acetic acid, and then, after having been freed from the excess of the coagulating bath, for instance by a slight pressure, it is cut into pieces or discs after which two so impregnated pieces or discs are laid one upon another so as to obtain a balanced textile unit. The operation is carried out, preferably, by first laying one upon another with their warp threads at 90° two pieces of molton impregnated with rubber coagulated in the above mentioned manner, and then by applying them upon one another so as to cause them to adhere by expelling a part of the coagulating bath remaining in the molton, after which discs are cut in the soformed, double layer, impregnated pieces of molton.

After washing with water during a sufficiently long time for eliminating the excess acid as well as the other substances soluble in water remaining in the discs, the latter are pressed into a hemispherical calotte. This operation is preferably effected by putting one of these discs of impregnated double layer, molton into a cylindro-hemispherical die the rim of which is formed by an annular ring embedded in the die and by stamping the disk by means of a cylindro-hemispherical punch which leaves between the die and the said punch a space corresponding approximately to the final thickness which the hemispherical calotte must have. The die can advantageously be provided with grooves or holes which permit of the evacuation of a certain quantity of water under the action of the stamping pressure.

The punch and the die are then separated one from the other which results in leaving the calotte on the punch with, surrounding it at its base, the annular ring which maintains the calotte on the punch.

The so formed unit is then allowed to dry until the water which is still contained in the hemispherical calotte has been practically removed. The ring is then removed from the calotte and the excess material which remains about the base of the calotte is cut away so as to give the calotte its definite hemispherical shape, the edge of the calotte terminating in a diametral sectional plane. This calotte is then dipped into a bath of rubber solution so that the whole surface of the calotte is covered. As soon as the solution is dry, two of these calottes are united together to form a sphere by bringing their diametral sectional planes in contact, after having introduced into one of these calottes a predetermined weight of a chemical compound capable of decomposing under the action of heat and emitting a gas, leaving no solid residue as far as possible. This body will be, for example, carbonate of ammoniac which decomposes at a temperature of about 80° C. The quantity of this compound introduced will be such that during its decomposition under the action of a rise in temperature such as has just been indicated, a high pressure of the order, for instance, of 2 to 3 kilogs per square centimetre, is created in the sphere formed by the assembly of the two calottes.

After shaping the sphere containing the substance utilized for the purpose of giving off gas under the action of heat, a strip of gum may be applied onto the joint of the two hemispherical calottes. The width, the thickness and the length of this strip are so determined that a previously fixed weight is obtained for the so formed roughed-out ball. This roughed-out ball is covered with pieces of canvas impregnated with rubber and cut out in such a manner that when joined side by side they completely cover the whole surface of the sphere. This will be obtained, for instance, by means of two pieces of canvas each of which has the form of a lemniscate similar to the form of the two pieces of felt which cover tennis balls as usually made. Each

roughed out ball is then placed into a spherical mould preferably formed of two parts applied one against another, this mould being provided with a small hole to allow the outside of the die to communicate with the inside. If the ball must be provided on its outside surface with projections or hollows, the die is provided, on its inner surface, with hollows or projections forming the counterpart of the configuration which the outer surface of the ball must finally have. Eventually, in order to obtain a better final appearance of the ball and also to obtain an indelible marking of the same, the inward portion of the opening of the hole with which the die is provided will be provided with a projection, for instance a circular projection which, accordingly, will produce in counterpart a hollow in the ball.

The mould containing the roughed out ball is then placed into a vulcanization autoclave where it is brought to the desired temperature during the time necessary for the vulcanization of the rubber entering into the constitution of the ball, this temperature being, in every case, sufficiently high for ensuring the decomposition of the gas-producing chemical compound in the inside of the ball. This evolution of gas presses the spherical wall of the ball against the die due to the pressure developed, and eventually gives rise to the formation of projections or hollows on the outer surface of the ball. This vulcanization ensures a thorough union of the different elements and ingredients forming the wall of the ball and homogenizes in a certain measure the mass which forms this wall.

As soon as the vulcanization is completed, a needle is introduced into the hole of the mould and the ball is perforated in order to permit the gases contained in the ball to escape and consequently to allow the inner pressure of the ball to balance with the outer pressure. For this purpose the perforating needle is preferably hollow and made in the form of a trocar. As soon as this balance of pressure is obtained, the mould is opened and the ball removed, after which the hole which had been bored is stopped. This is advantageously effected by introducing into this hole a rubber thread coated with a rubber solution which thread is cut at the level of the outer wall of the ball, that is to say at the level of the outer surface of the ball if the mould is smooth at this place, or at the level of the bottom of the small circular cavity provided in the outer wall of the ball if the mould is provided there with the above mentioned projection. In this latter case a lozenge of vulcanized rubber coated with a rubber solution is finally placed into the cavity in question.

To introduce the rubber thread into the hole which has been bored in the ball in order to balance the inner pressure with the pressure of the surrounding air, a tool is used which is formed, for example, of a punch or a hollow needle into which the rubber thread coated with a rubber solution is inserted, so that the said thread is flush with the point of the needle. The so equipped needle is introduced through the hole in the ball into the inside of the latter, carrying with it the rubber thread. This thread is then maintained in its position with respect to the ball, and the needle is removed until it leaves the wall of the latter. Since the rubber thread has remained stationary with respect to the ball itself during this movement, the walls of the hole close again onto the rubber thread. Thus the hole is stopped and the only thing remaining to do is to cut the rubber thread flush with the outer surface of the ball in one or the other of the above mentioned conditions. This being done, the above mentioned lozenge is then eventually applied and stops the cavity of the outer surface of the ball. When drying, the rubber solution which covers the thread unites the latter to the wall of the ball and thus tightly and definitively closes the hole which had been bored in the latter.

The appended drawing shows by way of example, on the one hand, a diagram of a plant adapted for making tennis balls according to the invention and, on the other hand, the ball during various steps of its manufacture.

In this drawing:

Figure 1 is a view in elevation of the first part of such a plant up to the coagulation of the latex in the impregnated fabric.

Figure 2 is a similar view showing the following steps of the manufacture up to the preparation of the pieces of impregnated fabric in which the discs which serve for making the balls are to be cut out.

Figure 3 is another similar view of the plant up to and including the operation of making the hemispherical calottes ready for making the balls.

Figure 4 is, in the same manner, a view in elevation of the following parts of the plant up to the production of calottes ready to be united in view of obtaining roughed out balls.

Figure 5 is a cross sectional view of the die for the production of a hemispherical calotte.

Figure 6 is a view of the corresponding punch.

Figure 7 shows the result obtained by punch pressing a circular blank by means of the die and punch of Figures 5 and 6.

Figure 8 is a view in elevation, partially sectional, of the calotte mounted on its punch.

Figure 9 is a view, partially sectional and partially in elevation, of a calotte during the drying operation.

Figure 10 is a view in elevation, partially sectional, of a half-calotte ready for assembly.

Figure 11 is a view of the roughed out ball comprising two calottes assembled together with a rubber layer applied onto the joint.

Figure 12 is a view of a calendered canvas element adapted for being applied onto the roughed out ball.

Figure 13 is a view in elevation showing the ball provided with two canvas elements according to Figure 12.

Figure 14 shows a vulcanization mould with the roughed out ball in the inside of same.

Figure 15 is a view in elevation of the ball after vulcanization.

Figure 16 is a partial sectional view showing the pressure-balancing hole.

Figure 17 is a view in elevation of the punch for the purpose of inserting the stopping thread.

Figure 18 is a sectional view showing the perforation of the ball and the punch in operation for the insertion of the stopping thread.

Figure 19 is a similar view of the stopping thread inserted.

Figure 20 is also a sectional view of the balancing hole stopped by the stopping thread with a finishing plug in place.

In the example of the plant shown for making the ball, the said plant comprises a vat **1** in which is placed a stack of cotton molton. In this vat which is filled with water to which a wetting agent has been added, the molton **2** is impreg-

nated with moisture. It is carried forth by a rotating roll 3 above which is a compressing roll 4 which expels the excess of water carried forth in the molton. Then the molton passes over another driving roll 5 and from there into a vat 6 containing a bath of latex 7. After having passed under the rolls such as 8 which maintain it under the surface of the latex, it passes between a driving roll 9 and a weighted roll 10 which is sufficiently heavy for expelling the excess latex as well as the air contained in the molton. From there the latex, carried forth by the rotating roll 12, passes into a coagulation vat 13 under rolls such as 14 where, after having been coagulated by contact with a bath of acetic acid 15, it is carried forth by a rotating roll 16 and placed onto a table 17 where its coagulation is completed. Carried forth by the set of rolls 18, it comes in a damp condition onto a table 19 where it is cut, by means of the cutting press 20, into square pieces of sufficiently large size to permit of subsequently cutting therein circular blanks of a suitable size for making calottes, each forming a half-ball.

The operator then lays two pieces of impregnated and coagulated molton one upon another so that the weft and warp threads of the one are at 90° with respect to the corresponding threads of the other. By means of a roll he presses these pieces one against the other in order to cause them to stick and in order to expel the excess coagulating liquid remaining in the impregnated fabric. The so impregnated and double layer pieces of molten are then washed with water in a vat 22 whence they are taken again in order to be cut into circular discs by means of the cutting press 24.

The discs 23 are then stamped out into hemispherical calottes in the dies 25 by means of punches 26. The said dies (see Figure 5) have internally, at 27, the outer shape of the calotte to be formed, and terminate at their upper part in a cylindrical ring 28 which is freely adapted to them. The punch 26 (see Figure 6) has externally a surface 29 corresponding to the inner shape of the hemispherical calotte to be formed, a cylindrical part corresponding to that of the ring 28, and a base 30. Figure 7 shows the stamped out calotte 31 the edge of which is clamped between the ring 28 and the punch 26. When leaving the stamping press 32, the punch 26 is removed from the die, carrying with it the hemispherical calotte 31 and the ring 28 (see Figure 8). During the stamping operation the liquid and the air which are in excess in the impregnated blank have been evacuated through passages such as 35 provided in the die.

The so formed half-calotte blank is placed with its punch and its ring on a heating table 34 for evaporating the water contained in the blank. As soon as the blank is dry, the ring 28 is removed and the excess 31*a* of impregnated molton is cut away by means of the press 35 so as to form a half-calotte 31 the edge 36 of which is in the diametral plane of the geometrical sphere of which the calotte is a part (see Figure 10). The so formed calottes 31 which have been removed from the punch are then dipped into a bath of rubber solution 37 and then dried in a drying-room 38. After drying, both calottes are united together by their rims 36 after introducing into one of them a certain quantity of carbonate of ammoniac, of other equivalent compound, capable of producing a gas at a temperature which is lower than or equal to the temperature of vulcanization. Thus a sphere is formed (see Figure 11). On the joint formed by bringing together both rims 36 of these hemispheres, a strip of gum 39 is placed, the thickness, the width and the length of which are determined so as to give the roughed out ball which has been so formed a weight which is equal from one ball to another and which is so established that, when completed, all the balls have a weight comprised between the limits fixed by the International Lawn-Tennis Federation regulations.

On the so formed roughed out ball two pieces 40 (see Figures 12 and 13) of canvas of balanced texture are applied which are coated on one of their faces with vulcanizable gum, calendered on the canvas. The shape of each of these pieces is such that, when two of them have been applied onto the ball, they completely cover the surface of the latter without overlapping one another, the gum layer being on the outside. It is advantageous to give them the shape of a lemniscate in the usual manner.

The so formed blank is placed into a mould (see Figure 14) formed of two parts 41—42 forming inwardly a sphere when they are symmetrically united one to another. The inner face of each of these pieces is provided with a series of grooves such as 43 adapted to produce on the outer surface of the finished ball projections 43*a* (see Figure 15) capable producing the same effect as the felt which covers the usual balls. In the embodiment shown on the drawing, the said grooves are circular and are generated by a triangle which is substantially an equilateral triangle lying in a diametral plane of the sphere and moving along a series of parallels to this sphere. There are provided in this case three sets of projections which are perpendicular one to another.

One of the pieces of the mould is provided with a barrel 44 slightly projecting into the inside of the piece and provided with a passage 45. The blank formed by the impregnated calottes 31 covered with pieces of gummed canvas 40 and coated with a coating 46 of rubber solution is placed into the die 41—42—43—44. Then a pressure is exerted by means of the plates 47—48 for pressing both parts of the mould one against another; the temperature of the latter is then brought to the temperature at which the vulcanization of the latex takes place as well as the vulcanization of the rubber solution and of the gum which enter into the composition of the blank. As above mentioned, the chemical compound 49 which has been introduced into the blank vaporizes at the temperature in question and exerts in the inside of the said blank a pressure which firmly presses the blank against the walls of the mould, thus causing the gum which impregnates the cover pieces 40*a* to penetrate into the grooves 43 and to fill them. As soon as the vulcanization has been completed, the ball is perforated by means of a trocar introduced through the passage 45, which causes the pressure in the ball to drop, the inside of the latter then being at atmospheric pressure. Then the mould is disassembled and the ball removed from the same. The only thing remaining to do, then, is to stop the hole 550 for communication with the outside air. In the embodiment described and shown, this is effected by means of a hollow punch 51 terminating in a hollow point 52 in which a passage 53 is provided. A rubber thread 54 coated with a gum solution is then introduced into the passage 53. The point 52 is caused to penetrate into the hole 50

and the rubber thread **54** is pushed so as to slightly project into the inside of the ball; then, while the thread **54** is maintained stationary with respect to the ball, the plug **51** is then drawn backwards. Then the thread **54** is held fast by the drawing together of the edges of the hole **50**. It is then cut at the level of the bottom of the recess **55** formed in the ball by the barrel **44** of the die, and in this recess a lozenge **56** is stuck which covers the end of the stopping thread **54**. Thus thread and lozenge are firmly stuck to the ball.

The lozenge **56** can be of any desired colour so as to permit an identification of the balls, for example in the course of the game.

The preceding specification and the appended drawings correspond to an embodiment of the invention. Other embodiments of the invention can also be imagined without departing from the scope of the invention. Thus, for example, to obtain a balanced fabric by laying one upon another two moltons or equivalent fabrics at 90° with respect one to another, instead of impregnating the said moltons separately as in the above described embodiment, and then applying them one against another, it would be possible to apply them one upon another at 90° before the impregnation, the so formed unit being then impregnated.

LÉON SYLVAIN MAX LEJEUNE.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

L. S. M. LEJEUNE

PROCESS FOR MAKING TENNIS BALLS

Filed Dec. 27, 1941

Serial No. 424,624

5 Sheets-Sheet 1

Fig. 1

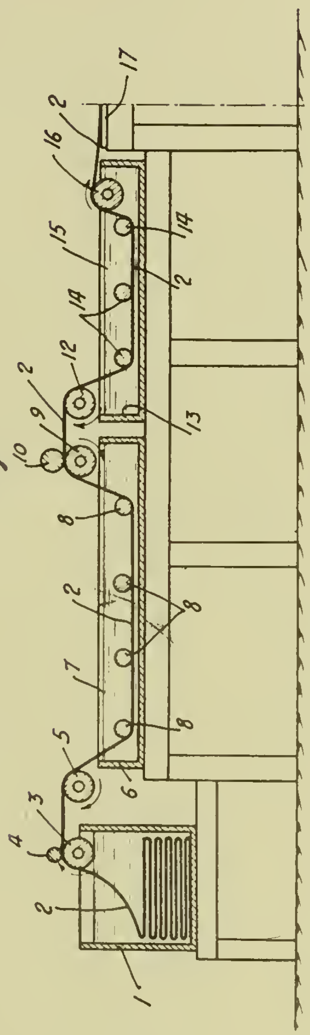
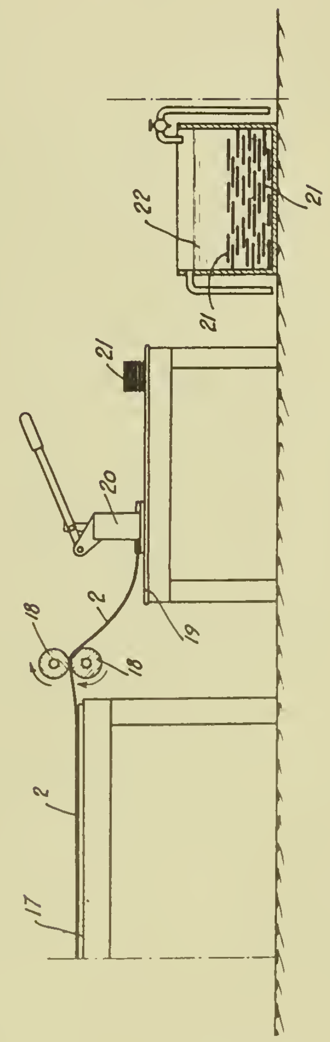


Fig. 2



Inventor,
L. S. M. Lejeune

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

L. S. M. LEJEUNE
PROCESS FOR MAKING TENNIS BALLS
Filed Dec. 27, 1941

Serial No.
424,624
5 Sheets-Sheet 2

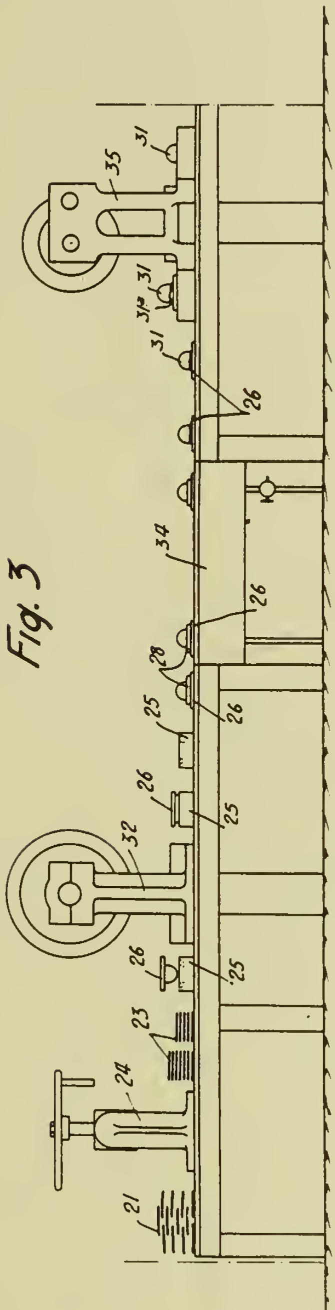


Fig. 3

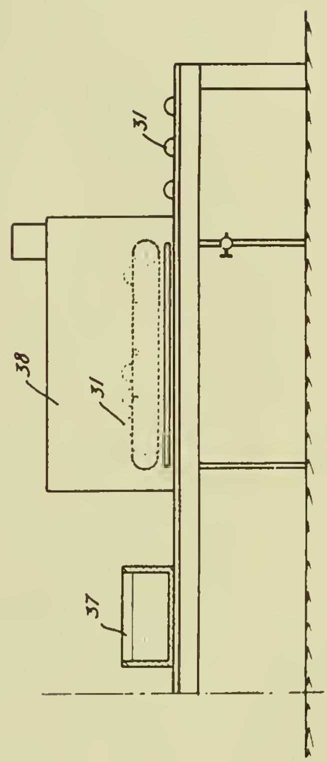


Fig. 4

Inventor,
L. S. M. Lejeune

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

L. S. M. LEJEUNE
PROCESS FOR MAKING TENNIS BALLS
Filed Dec. 27, 1941

Serial No.
424,624
5 Sheets-Sheet 3

Fig. 5

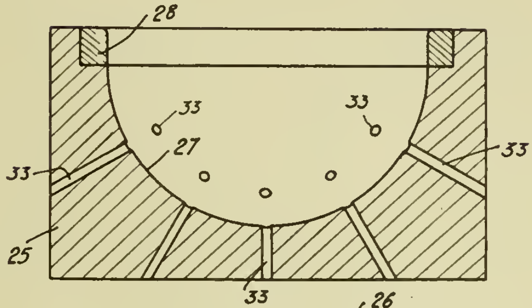


Fig. 6

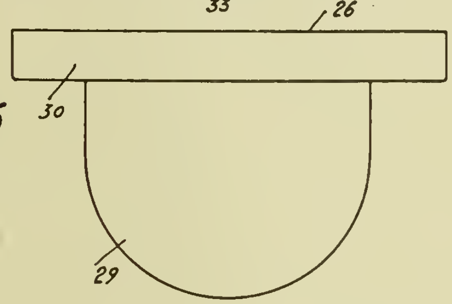


Fig. 7

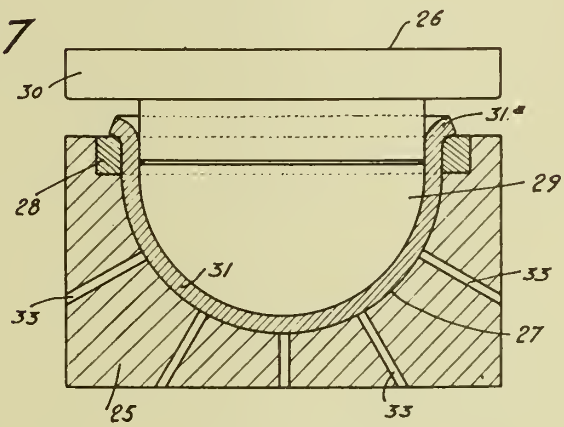
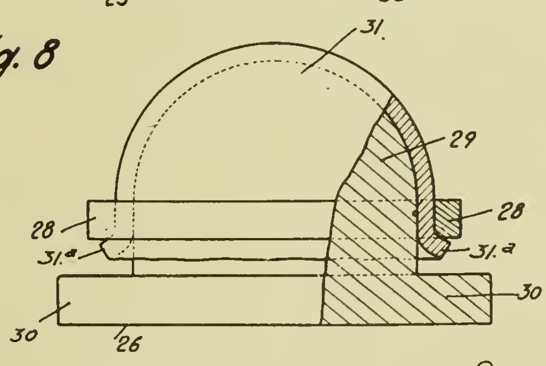


Fig. 8



Inventor,
L. S. M. Lejeune
By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

L. S. M. LEJEUNE
PROCESS FOR MAKING TENNIS BALLS
Filed Dec. 27, 1941

Serial No.
424,624
5 Sheets-Sheet 4

Fig. 9

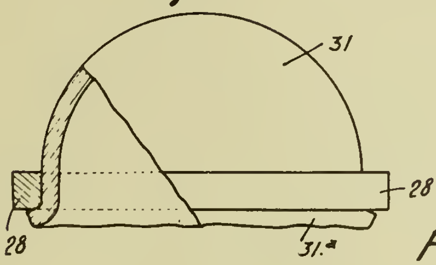


Fig. 10

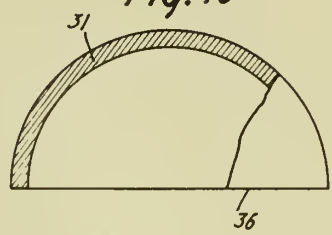


Fig. 11

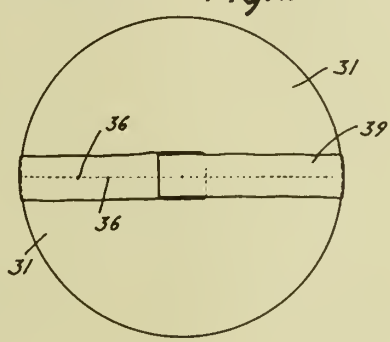
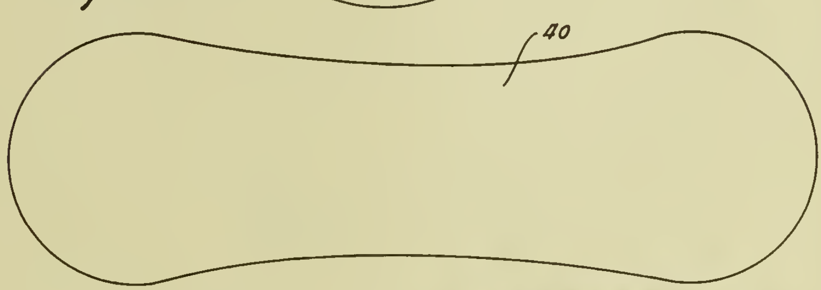


Fig. 12



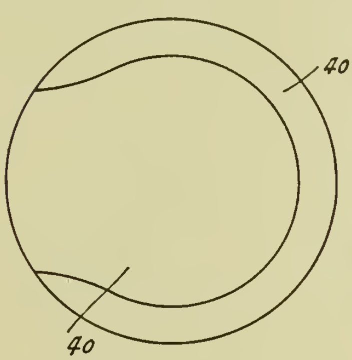


Fig. 13

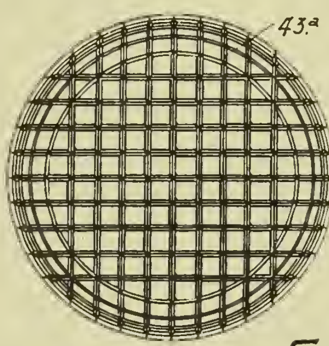


Fig. 15

Inventor,
L. S. M. Lejeune
By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

L. S. M. LEJEUNE
PROCESS FOR MAKING TENNIS BALLS
Filed Dec. 27, 1941

Serial No.
424,624
5 Sheets-Sheet 5

Fig. 14

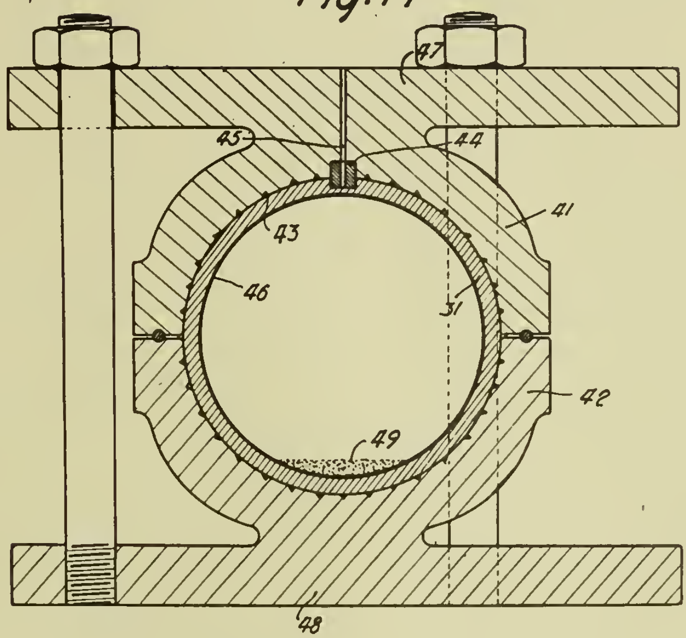


Fig. 17

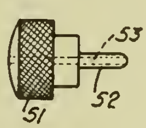


Fig. 16

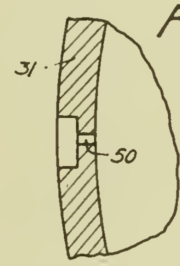


Fig. 18

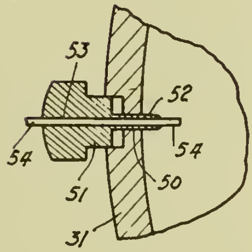


Fig. 19

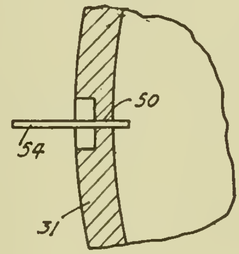
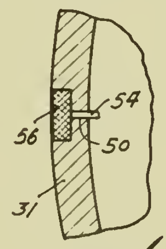


Fig. 20



Inventor,
L. S. M. Lejeune
By: Glascock Downing & Seebold
Attys.

Published May 11, 1943 Serial No. 427,984

ALIEN PROPERTY CUSTODIAN

PHARMACEUTICAL PREPARATIONS POSSESSING SURFACE-ACTIVE PROPERTIES AND PROCESS OF MAKING SAME

Hermann Engelhard, Berlin, and Werner Petri, Lichterfelde-Ost near Berlin, Germany; vested in the Alien Property Custodian

No Drawing. Application filed January 23, 1942

This invention relates to pharmaceutical preparations possessing surface-active properties and to a process of making same.

The invention is principally concerned with the production of a new pharmaceutical preparation for the treatment of cavities of the body, and has for its particular object to indicate a pharmaceutical preparation possessing surface-active qualities.

In combatting an infection or other disease of the mucous membranes of the nasal and pharyngeal cavities and of the upper air passages with the aid of disinfectants, curatives or other efficacious substances two ways are possible:

(1) When combatting a disease from the inside, the curative is taken internally or injected and passes into the blood and thus to the point of attack of the excitants of disease. This method has nothing to do with the invention.

(2) Combatting a disease from the outside usually involves the prescription of dissolving the curative in the mouth.

In the second instance, how does the curative pass to those places affected by the excitants of disease that cannot be reached directly.

Just the best disinfectants which in vitro show the strongest bactericidal properties like the remedies known under the trade names trypaflavin (3,6 - diamino-10-methyl-acridinium-chloride), rivanol (and allied derivatives of acridine) or prontosil (4 - sulfonamide - 2′,4′-diaminoazobenzene) and its allied compounds are not surface-active. When such preparations are dissolved in the mouth, the curative does not appreciably spread out from that point to, say, the mucous membranes of the nose or trachea, on which frequently the main places of the infection caused by the excitants of disease are to be found.

Apart from non-surface-active disinfectants, this generally applies also in corresponding manner to curatives or other efficacious substances which are not, or not sufficiently, surface-active. Conditions are not altered by introducing such substances for instance into the nose.

Spreading of the substances will in every instance occur merely by diffusion, i. e., very slowly and only over short distances.

Disinfectants and curatives are known also which show a different behavior. For example, if phenol is applied to the tip of the tongue, it will be found that clearly appreciable spreading occurs from there, which is limited of course by the fairly high solubility of the matter, since phenol, unlike the above-mentioned substances, is surface-active, i. e., it spontaneously spreads out when placed on a surface of water.

Film-forming surface-active substances are known for quite a while in colloid chemistry. They form a species of substances which may belong to totally different classes of chemical compounds. Common to all of them is the tendency spontaneously to spread over a boundary surface liquid/air, as over a water surface, while forming a monomolecular surface film. It is evident that a disinfectant or other curative or efficacious substance showing spontaneous surface diffusion would be particularly suited for fighting diseases of the mucous membranes of the nasal-pharyngeal cavity or of other mucous membranes in cavities of the human or animal body as well as for disinfecting discharging wounds, etc., provided they have available a boundary surface of liquid and air.

The known disinfectants, however, which are surface-active themselves, have either a very slight disinfecting effect or are unsuitable owing to excessive irritation or for other reasons.

The question arises therefore how substances, as the curative known under the trade name "trypaflavin" or any other curative or efficacious substances which are not surface-active per se, or not to a sufficient degree, can be brought to the point of attack of the excitants of disease, e. g., approximately to the rear regions of the nasal-pharyngeal cavity, so as to be able to develop their healing power at that place.

The solution of the problem is offered by the following invention: A known curative matter which does not possess sufficient diffusion pressure itself, or none at all, is combined for instance with one of the surface-active substances that are also known. The union is preferably effected by dissolving or intimate mixing or emulsification.

When the solution (mixture or emulsion) of the two substances is brought upon a water surface it would be natural to expect its separation into its component parts during its application to the surface and the diffusion of only the surface-active carrier substance while the curative that is not surface-active itself would be left behind. Surprisingly, this is not the case, but even the non-surface-active component is diffused.

It is possible also to build up the non-surface-active component from several individually non-surface-active substances (for instance a disinfectant and a sedative for the affected mucous membrane or substances having other curative effects).

The curative can therefore be fully adapted to the desired healing purpose; at any rate, the product of the dissolving, mixing or emulsifying processes, in or with a film-forming surface-active carrier substance, will acquire surface-active properties and, if brought upon a water surface, spontaneously diffuse along the boundary surface liquid/air.

It should be considered in this respect that the "classic" film-formers of colloid chemistry, as oleic acid, are insoluble in water. Such substances, when placed upon a water surface, form a monomolecular surface film in a single spontaneous diffusing action. However, even if the most favorable dissolving conditions prevail, the quantities of non-surface-active curatives entrained during this single diffusing action will be too small to insure a sufficient healing effect.

In order to prepare a curative possessing surface-active properties it will therefore be preferred to choose a surface-active component which still shows some solubility in water. The degree of solubility in each instance depends upon the surface and the quantity of the liquid over which the non-surface-active component is to be distributed. It may therefore vary within wide limits from 1: a few 100 to 1: a few 10,000 or even 100,000. Furthermore, it must be taken into consideration that the diffusion pressure in a homologous series increases with growing insolubility (Traube's rule). To obtain the greatest possible diffusion pressure the solubility chosen should therefore be as slight as possible. A relative solubility must be present, however, in each instance.

Because, if the surface-active component shows slight solubility in water, the surface film formed at first during spontaneous diffusion will dissolve and thus cause repeated diffusion. When the non-surface-active component is also soluble in water, a current distribution of the water soluble curative over the entire surface and thence into the interior of the liquid will be attained.

Should the non-surface-active component be only poorly soluble in the surface-active one, greater efficiency may often be obtained by the addition of a third substance capable of dissolving both components. This component, too, should preferably be soluble in water, since otherwise within a short time the boundary surface liquid/air will be occupied by this substance and further diffusion at least be considerably hindered.

The effect of the process may be demonstrated by the following tests:

Three large clean porcelain basins (measuring approximately 30×35×6 cm.) are filled three-fourths with water of room temperature, whereupon successively

(1) A small amount of the substance known under the trade name "trypaflavin" (3,6-diamon-10-methylacridiniumchloride) in substance,

(2) A few drops of an aqueous trypaflavin solution and

(3) A few drops of a solution of trypaflavin in hexylalcohol

are added to each of the basins. Whilst in case of test (1) and (2) no essential diffusion over the points of application occurs, the trypaflavin, which is non-surface-active itself, will in the third test be instantly diffused over the entire surface of water, and the diffusion can, moreover, be very often repeated, since the surface film formed at first by the hexylalcohol in spontaneous diffusion disappears due to the slight solubility of the hexylalcohol, whereupon the formation of a new film accompanied by further transport of the non-surface-active substance occurs.

Example 1

0.2 g. of the substance known under the trade name "trypaflavin" (3,6-diamino-10-methylacridiniumchloride) and 7.5 cu. cm. hexyl-lactate (lactic acid-n-hexyl-ester) are triturated with 100 g. finely pulverized cane sugar and made into tablets if necessary.

Example 2

0.2 g. of the substance known under the trade name "prontosil" (4-sulfonamide-2',4'-diamino-azobenzene) and 7.5 cu. cm. hexyl-lactate are triturated with 100 g. finely pulverized cane sugar and made into tablets if necessary.

These mixtures may serve for disinfecting the nasal-pharyngeal cavity.

Example 3

5 cu. cm. hexyl-lactate are thoroughly triturated with 100 g. of the substance known under the trade name "prontosil" (4-sulfonamide-2',4'-diaminoazobenzene) in a finely pulverized state.

This pulverulent mixture to which pain-relieving agents may be added is adapted to serve as strewing powder for discharging wounds.

It is therefore possible to prepare in every instance, by dissolving, mixing or emulsifying a water soluble disinfectant, curative or other efficacious substance possessing insufficient diffusion pressure or none at all with a film-forming surface-active substance of slight water solubility, remedies which, besides their original curative effect, have also the novel property of spreading out over boundary surfaces liquid/air.

The non-surface-active component may be built up from several non-surface-active individual components to attain particular healing effects. Likewise, the carrier substance may be composed of several individual components, possibly for obtaining a favorable surface melting point or better conditions of solubility. Finely, if the dissolving power of the surface-active component is too unfavorable for the non-surface-active one, a third component may be added which per se, possibly owing to a too high solubility in water, does not show sufficient formation of film but which improves the conditions of solubility of non-surface-active curatives in the film-forming component.

HERMANN ENGELHARD.
WERNER PETRI.

Published May 11, 1943 Serial No. 428,778

ALIEN PROPERTY CUSTODIAN

INTERNAL COMBUSTION ENGINES WITH CROSSHEAD

Ove Petersen, Gentofte (near Copenhagen), and Mads Lindberg-Nielsen, Copenhagen, Denmark; vested in the Alien Property Custodian

Application filed January 29, 1942

In internal combustion engines with crosshead the crosshead is generally made in the form of a forged body which has an attachment hole, in which the end of the piston rod fits, and crosshead journals around which the connecting rod grips, and moreover one or more plane sliding surfaces through which the side thrust is transmitted to the guide or guides fitted on the rigid parts of the framing of the engine.

This construction has hitherto been regarded as the only suitable construction for heavy internal combustion engines arranged for larger outputs per cylinder, to which type of internal combustion engines this invention chiefly relates. The said known construction suffers, however, from certain drawbacks, the remedying of which is the chief aim of this invention. In the known embodiments is e. g. the crosshead body proper an expensive and heavy member the shaping of which, out of regard to the attainment of the necessary strength alone, is comparatively so complicated that it is difficult to obtain sufficiently large bearing surface for the connecting rod brasses, and this is especially the case in two-stroke engines. The alignment of the plane sliding surfaces in relation to the piston rod and the gudgeon and the crank shaft must be performed with very great care, as even very small inaccuracies in this respect will cause great side thrusts in directions where they are not desired and an inaccurate travel of the piston in the cylinder liner. Likewise it is difficult to obtain an equally large guide area for taking up the guide thrusts during astern working as during ahead working, and the usually considerable over-weight of the crosshead body in the side facing the guide will, on account of the acceleration forces, give rise to powerful turning momenta which tend to tip the crosshead and thereby strain the connection with the piston rod strongly, while at the same time there are caused local increases of pressure at the upper and lower ends of the sliding surface of the crosshead.

As the guide proper must be provided with heavy strengthening ribs it is likewise a heavy and comparatively expensive engine part, and the mounting thereof on the rigid parts of the engine must be performed with the greatest care out of regard to the necessary alignment of the plane sliding surface in relation to the cylinder liner and the crank shaft.

By this invention which as previously mentioned first and foremost relates to a new construction of the crosshead and the crosshead guide in an internal combustion engine, especially an internal combustion engine arranged for great outputs per cylinder, the above mentioned drawbacks of the known crosshead constructions are avoided.

The essential feature of the invention is first and foremost that the crosshead is made in the shape of a short trunk piston. In this piston there is in the usual way, e. g. by force fitting, fitted a gudgeon which forms the point of application for the connecting rod. The piston-shaped crosshead is guided in a cylindrical liner, one end of which is secured to and centered in relation to the rigid framing parts of the engine, whereas the other end is preferably supported against rigid parts of the framing so as to be able to slide in the direction of the axis of the cylinder in such a way that mobility in any transverse direction is prevented.

The essential advantages obtained by this construction consist in an easier and cheaper construction of the crosshead body proper, which assumes the shape of a simple cylindrical trunk piston. To this the connecting rod may be attached by a simple cylindrical gudgeon which is cheap to manufacture and especially possesses the advantage that it may be hardened in its full length and can be given an ample bearing area. The attachment of the piston rod to the crosshead may also be effected in a simpler and more expedient way than hitherto, it being possible to provide the end of the piston rod with a flange which rests against a corresponding turned surface on the end of the crosshead body and is secured thereto by means of bolts that are easily accessible for tightening.

With regard to the crosshead guide there will also be obtained a considerable simplification and improvement in comparison with the hitherto used constructions. The cylindrical guiding liner e. g. forms a tubular girder of very considerable strength and rigidity and may therefore be constructed of a smaller weight than a plane crosshead guide for taking up the same side thrust. The cylindrical shape of the crosshead guide furthermore entails that the sliding surfaces and all the alignment surfaces necessary for the erection may be machined in the same fixing in the turning lathe, and as the alignment surfaces on the rigid engine parts which decide the position of the liner in relation to the cylinder liner and the other parts, in relation to which the crosshead guide is to be aligned, may likewise be made by operations that automatically ensure their proper mutual orientation, the correct alignment of the crosshead guide in relation to the other engine parts will thus be a matter of course

when the parts are assembled. The difficult and timewasting alignment work that was formerly necessary at the erection of the engine and at the assembling, when later on the engine had been taken apart, thus becomes superfluous.

This especially makes itself felt in engines of the kind which have a longitudinal, usually box-shaped girder, carried by frames, and in which the individual cylinders are secured or at any rate centered. In this case the cylindrical cross-head guides are expediently at their upper ends provided with a centering collar which fits into a centering hole in the bottom of the said girder, and with an attachment flange by means of which they are attached to the planed under side of the girder. The lower end of the crosshead guide may then be stayed by divided horizontal staying plates which are inserted between the frames and tightened around the guiding liners, after the latter have been secured to the longitudinal girder.

The centering holes for the cylinder liners in the girder should be made in the same fixing as the corresponding centering holes for the cross-head guides, whereby the alignment of the cylinder liners in relation to the corresponding cross-head guides is ensured.

The new construction offers essential advantages also with regard to the taking up of the guide pressures. The fact is that the crosshead guide can take up side thrusts in all possible directions in a quite uniform manner.

In cases where the crosshead guide is centered in a hole in the bottom of a box-shaped longitudinal girder it is advantageous to close the latter downwardly by placing a cover over each centering hole, in which cover a stuffing box must be provided, through which the piston rod passes. Hereby is obtained in part that it is possible in a way known per se to use the box-shaped girder as a scavenging air receiver, in part that above the piston-shaped crosshead there will be formed a space that may be used as a pumping chamber for the supply of scavenging and charging air, as the piston-shaped crosshead in connection with the cylindrical liner thus will form a pump.

The stroke of this pump is the same as that of the working piston, and the amount of air supplied must therefore be adapted by a suitable choice of the diameter of the piston-shaped crosshead. In two-stroke engines the diameter of the crosshead must thus be somewhat greater than that of the working piston, if the whole amount of air required should be supplied by the pumping arrangement here mentioned. Normally it will be sufficient when the useful piston area of the crosshead is made 15–20% larger than that of the working piston. In that case the invention thus makes it possible to omit completely the special blower otherwise required in two-stroke engines.

What is necessary for understanding the invention and the secondary features thereof will appear from the following description of an embodiment in connection with the accompanying drawing, which partly diagrammatically shows a vertical section through a cylinder unit of a two-stroke internal combustion engine constructed in accordance with the invention. We point out that the lefthand half of the drawing shows a section at right angles to the longitudinal direction of the crank shaft and the engine, while the righthand half of the drawing shows a section parallel to the longitudinal direction.

On the drawing 1 and 2 designate frames erected on the bed plate, not shown, of the engine at right angles to the longitudinal direction of the engine between the cylinder units. On these frames rests a box-shaped girder 3, which as shown on the drawing, may be in one piece for several cylinders and be stayed by internal partitions 4, or which may be made up of elements bolted together, each of which corresponds to a cylinder unit.

On the top of the box-shaped girder 3 which extends in the longitudinal direction of the engine are placed cylinder frames 6, of which frames there is supposed to be one for each cylinder unit, and to which the cover 7 of the cylinder shown is bolted. For the sake of simplicity the usual mechanisms on the cylinder cover are not shown on the drawing. To the cylinder cover the cylinder liner 8 is bolted in the usual manner, and the lower part of the freely depending liner is carried down through and guided transversally in a centering hole 31 in the upper side of the box-shaped girder 3. In order that the liner may be able to expand freely in the axial direction for the elimination of heat expansions it is movable axially in the centering hole 31, where a sealing is effected by means of an inserted sealing ring 11 placed in a turned groove in the cylindrical centering surface 10 on the liner co-operating with the centering hole 31.

The space 44 between the cylinder frame 6, the cylinder cover 7, and the upper part of the cylinder liner 8 serves as a cooling jacket, it being closed at the bottom by means of a collar 9 on the cylinder liner fitting into a hole in the bottom of the approximately box-shaped cylinder frame.

In the end of the cylinder liner 8 projecting down into the box-shaped girder 3 are scavenging ports 12 which in the lower dead point position of the piston 13 are above the upper edge of the latter and permit scavenging air to flow from the interior of the box-shaped girder into the cylinder.

The piston 13 rests on and is bolted to an upper flange 15 on the piston rod 14 and is cooled by a cooling medium preferably oil, which is supplied through a telescope pipe 16 and led away through a corresponding telescope pipe, not shown.

In the bottom 29 of the box-shaped girder 3 there is, exactly co-axial with the centering hole 31 for the cylinder liner, a centering hole 30, and some distance above the latter the lower side of the girder is closed by means of a cover 17, which is fitted in halves around the piston rod and the said telescope pipes and has stuffing boxes, 18 and 19 respectively, for these.

The piston rod has at its lower end a flange 20, by which it rests against and is bolted to a crosshead 21, which has the form of a short cylindrical trunk piston. Through the material of this piston are carried longitudinal borings, which are in line with the telescope pipes 16 rolled into holes in the flanges 15 and 20 of the piston rod and at the bottom have stuffing boxes 40, through which the stationary part 39 of the telescope pipes is introduced.

In the piston-shaped crosshead 21 is fitted a cylindrical gudgeon 22, which may be fixed by any suitable means, preferably by force fitting. The gudgeon 22 forms in the usual way a journal for the upper end of a connecting rod 23, the lower end of which is secured by bolts 24 to a connecting rod bearing 25, that is attached to a crank 26. The crank shaft of the engine is

designated by 28, and one of the crank arms belonging to the said cylinder unit by 27.

The cylindrical piston-shaped crosshead 21 travels in a crosshead guide 32 which has the form of a cylindrical liner. The cylindrical guiding liner has at the top a centering collar 33, with which it fits into and is centered in the previously mentioned centering hole 30 in the bottom 29 of the box-shaped girder 3, whereby its proper position in the side direction is ensured in relation to the girder 3 as well as in relation to the cylinder liner, which is guided in the centering hole 31 placed co-axially with the centering hole 30. These two centering holes should preferably be produced in the same fixing.

The alignment of the longitudinal axis of the cylindrical crosshead guide in relation to the girder 3 is ensured by means of a turned flange at the upper end of the crosshead guide, by means of which flange the crosshead guide is bolted to the planed under side of the box-shaped girder. Hereby is at the same time ensured the accurate alignment of the crosshead guide and the cylinder liner, the axial alignment of the latter likewise being definitely decided in relation to the girder 3 on account of the mode of suspending the cylinder liner described above.

The tubular crosshead guide 32 has because of its sectional shape a considerable rigidity and may therefore be made comparatively light. A further economy of material can be obtained in the case that the lower end of the crosshead guide is stayed in the side direction in such a way that part of the side thrust of the cross-head is taken up here and transmitted to the framing of the engine. This is, in the embodiment shown, effected by means of a collar 36 which is fitted around a turned surface at the lower end of the crosshead guide and, after the alignment and securing of the latter, secured to a plate 35 that is inserted between the frames 1 and 2 and suitably made in halves. This plate may expediently at the same time serve to close the crank case upwardly, in which case the axially movable connection between the crosshead guide and the collar 36 should be packed tight by a packing 37 as shown. Directly below the lower part of the crosshead guide are found brackets 38 that carry the stationary telescope pipes 39 before mentioned.

The whole construction described is held together in the usual way by vertical bolts or corresponding tension members, of which some may e. g. serve for securing the cylinder frame 6 to the box-shaped girder 3, while others secure the latter to the transverse girders or corresponding members of the bed-plate of the engine on which the main bearings for the crank shaft are placed.

In the embodiment shown the interior of the box-shaped girder 3 serves, as previously mentioned, as a scavenging air receiver, and the girder has for this purpose an opening 43 in one of its side walls, through which the scavenging air may be admitted. In the previously mentioned internal transverse walls 4 there is likewise a hole 5. It may, however, also be expedient to let the interior of the girder be divided into a series of separate receiver chambers, one for each cylinder, whereby the pressure and oscillation conditions may better be controlled during the scavenging and the charging.

Between the cover 17 which closes the box-shaped girder below and the upper end of the cylindrical crosshead guide there is a space 41, which opens out with an opening 42 below on the side of the box-shaped girder. This space 41 serves for the control of the tightness of the stuffing boxes 18 and 19 besides for ensuring that no splash oil from the crosshead guide will penetrate into the girder 3.

It will, however, be seen that the piston-shaped crosshead 21 together with its crosshead guide 32 forms a pump that may be employed for useful purposes, especially for the conveyance of air, in which case the space 41 will be the clearance of this pump. The necessary section- and pressure valves which may be automatic or controlled may advantageously be fitted in a case which is bolted to the side of the girder 3 covering the opening 42. The air which is conveyed may be used for scavenging, charging or supercharging of the cylinder, and it may be so arranged that the pumping arrangement for each cylinder unit will only feed the corresponding cylinder, or several pumping arrangements can supply air to a common receiver from which several cylinders are supplied with air.

In the embodiment shown the engine is a two-stroke engine, and it is a presupposition that the whole amount of scavenging- and charging air required can be supplied by the crosshead pump. The diameter of the piston crosshead must therefore be so much greater than the diameter of the working piston that the effective pumping piston area will become about 15–20% larger than the effective area of the working piston. This demand as to the proportioning of the crosshead is in practice very well compatible with the regards as to proportioning that must be paid as to an easy taking apart of the engine for inspection. It being presupposed that it is a question of the most common inspection- and repair works, i. e. examination and overhauling of cylinder liner and piston, the method used here may be as follows.

At first the cylinder frame 6 is loosened from the girder 3 and removed from the engine by being lifted vertically. The piston is than accessible for examination and changing of piston rings, but may in case that heavier repairs are necessary be taken off by disconnecting it from the piston rod, or by the piston rod being disconnected from the crosshead. Finally may the piston with piston rod, crosshead, and connecting rod be taken out by the connecting rod being disconnected from the connecting rod bearing 25, after which the whole may be pulled vertically out of the engine without further taking apart of the latter. Here is only presupposed that the crosshead can pass upwards through the girder 3, i. e. that the hole for the cover 17 is of a slightly greater diameter than the crosshead, and that the centering hole for the cylinder liner is also slightly larger than the crosshead. Both of these conditions can easily be fulfilled, and thus there is no difficulty in arranging the crosshead pump for supplying the whole amount of scavenging- and charging air required, even when the engine is a two-stroke engine.

In that case the crosshead pump may draw in air direct from the atmosphere and press the air through a piping leading from the pressure valve direct into the girder 3 serving as a scavenging air receiver.

The invention is not bound to the construction shown and described, which is given as an example of an especially advantageous engine type constructed in accordance with the invention. The invention can wholly or partly be applied also in other engine types, e. g. in four-stroke

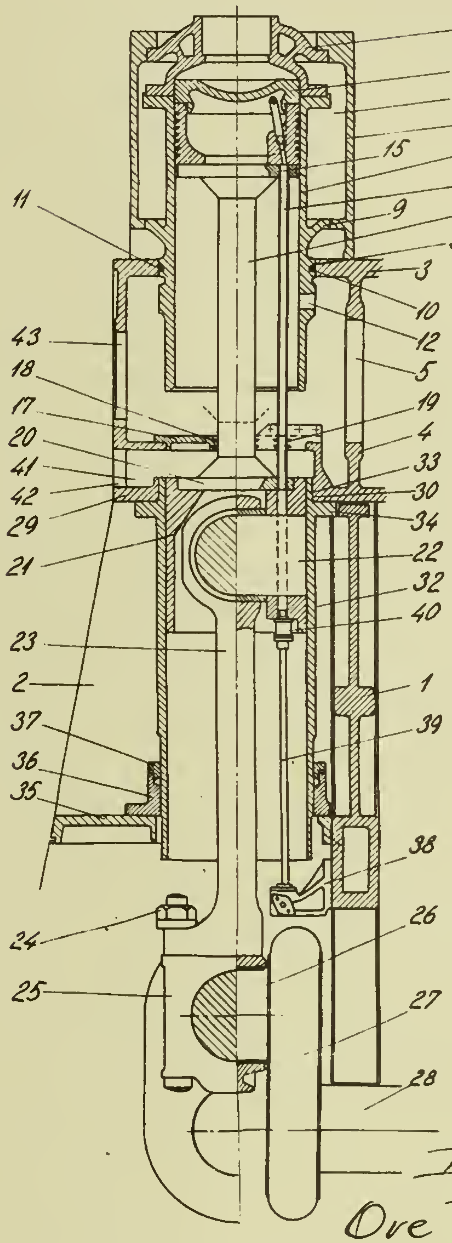
engines, and in engines with another total erection of framing and cylinder construction. The advantages of the automatic alignment of crosshead guide and cylinder liner will be obtained in all engine constructions where it is possible to centre and/or secure the crosshead guide and the cylinder liner to a common rigid engine part, which may otherwise very well consist of several individual elements that are mutually connected more or less permanently. There is nothing to prevent applying the invention also in double-acting engines, in which case the special construction of the telescope pipe connection to the working piston shown here cannot, however, be applied.

OVE PETERSEN.
MADS LINDBERG-NIELSEN.

PUBLISHED O. PETERSEN ET AL Serial No.

MAY 11, 1943. INTERNAL COMBUSTION ENGINES WITH CROSSHEAD 428,778

BY A. P. C. Filed Jan. 29, 1942



Inventors
Ove Petersen
Mads Lindberg-Nielsen
By Glascock Downing & Seebold
Attys

Published May 11, 1943

Serial No. 429,040

ALIEN PROPERTY CUSTODIAN

GEAR PUMPS

Fritz Egersdörfer, Berlin, Germany; vested in the Alien Property Custodian

Application filed January 31, 1942

My invention relates to improvements in gear pumps, and more particularly in gear pumps of the type comprising three interengaging gear wheels arranged in a casing provided with suction and pressure passages, the inner gear wheel cooperating with the outer gear wheels to provide two pumps. The object of the improvements is to provide a pump of this type in which the capacity of one pump may be varied, while the capacity of the other pump remains constant. With this object in view my invention consists in mounting one of the outer gear wheels so as to be shiftable in axial direction for varying the interengaging portions of the length of the teeth of said outer gear wheel and the inner gear wheel, bushings being provided at opposite sides of the said shiftable outer gear wheel and movable therewith. Pumps of this type may be used for supplying pressure fluid to a hydraulic mechanism designed for use in connection with certain machine tools such as shaping machines and horizontal and vertical planing machines in which the velocity of the working stroke is to be regulated while the return stroke has uniform movement.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawings in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawings

Fig. 1 is a sectional elevation taken on the line 1—1 of Fig. 3 and showing the gear pump, the gear wheels of both pumps being in the position for conveying the maximum of the fluid,

Fig. 2 is a similar sectional elevation showing one of the pumps set to reduced feeding capacity,

Fig. 3 is a sectional elevation taken on the line 3—3 of Fig. 1,

Fig. 4 is a sectional elevation taken on the line 4—4 of Fig. 1,

Figs. 5 and 6 are somewhat diagrammatical elevations partly in section showing the hydraulic mechanism including the pumps, the valve controlling the supply of the pressure fluid, and the cylinder and piston by which reciprocating movement is transmitted to the machine tool or the like.

In describing the invention the gear pump will be described in connection with a hydraulic mechanism for imparting reciprocating movement to the slide of a machine tool. The pump has been shown in detail in Figs. 1 to 4. It comprises a casing 1 closed at its ends by heads 2 and 3, and three gear wheels 4, 5 and 6 mounted respectively between bushings 7, 7 and 8, 8 and 9, 9'. The bushings 7 and 8 are fixed to the heads 2 and 3, for example by means of screws 50, and the lower bushings 9, 9' are axially shiftable but not rotatable within the casing 1, the bushing 9' being reduced in length to permit such axial displacement. The upper gear wheel 4 is rotatably mounted on a stationary shaft 10 mounted in the bushings 7, 7 and fixed thereto by means of a pin 51. The gear wheel 4 is mounted on the said shaft 10 by means of an anti-friction bearing 52. The gear wheel 5 is keyed to a shaft 12 rotatably mounted in the bushings 8 by means of anti-friction bearings 53 and passed through a stuffing box 54 provided in the end wall 2, the said shaft being connected to the main driving shaft of the machine tool or the like for being rotated thereby at uniform velocity. The gear wheel 6 is rotatably mounted by means of an anti-friction bearing 55 on a shaft 13 secured to the bushings 9 and 9' by means of keys 56. The shaft 13 is connected with a stem 15 rotatably mounted in the head 3 and formed at its inner end with a head 57 having external screw threads and engaging in internal screw threads of a cylindrical socket 11 made in the bushing 9. The said stem 15 is formed with a collar 58 held in position between the head 3 and a washer 59. Thus, when the stem 15 is rotated the bushing 9, the shaft 13, the bushing 9' and the gear wheel 6 are shifted in axial direction. By shifting the gear wheel to the left, for example into the position shown in Fig. 2, the capacity of the spaces included between the teeth of the gear wheels 5 and 6 and therefore the volume of pressure fluid supplied by the pump are reduced.

In the casing of the machine a pressure passage 16 and a suction passage 18 for the pump comprising the gear wheels 4 and 5 and a pressure passage 17 and a suction passage 19 for the pump provided by the gear wheels 5 and 6 are provided, the said suction and pressure passages being adapted to be connected to suction and pressure conduits, as will be described hereafter. It will be understood that the upper pump 4, 5 always conveys the same amount of pressure fluid, while the amount of pressure fluid supplied by the pump 5, 6 is variable and dependent upon the axial adjustment of the gear wheel 6.

As is shown in Figs. 5 and 6 the pump thus described is used in a hydraulic mechanism for producing reciprocating movement, which is connected for example to a planing machine (not shown). The mechanism has been illustrated in Figs. 5 and 6. The pump is connected with a

controlling valve, comprising a cylinder 28 having three cylindrical slide valves 29, 30 and 31 shiftable therein, the said slide valves being connected with each other and with a lever 45 rockingly mounted at 60. The slide valve is connected by pipes 26 and 27 with the opposite ends of a cylinder 20 in which a piston 21 has reciprocating movement. The piston rod 22 of the said piston is connected with a head 23. By the said slide valves the cylinder 28 is divided into four chambers which are connected with the suction and pressure passages of the pump. The pressure passages 16 and 17 of the pumps are connected by pipes 32 and 33 respectively to the chambers 44 and 42 provided between the slide valves 29 and 30 and 30 and 31. The suction passages 18 and 19 are connected by pipes 40 and 41 with a tank 38 containing the pressure liquid. The said tank is further connected by a pipe 39 and branch pipes 34, 36 and 37 with suitable parts of the valve casing 28.

In the position of the slide valves 29, 30 and 31 shown in Fig. 5 pressure fluid is supplied to the cylinder 20 from the lower pump 5, 6 and through the pipe 33, the chamber 42, and the pipe 26 in a direction for transmitting feeding movement to the planing machine. The volume of pressure liquid supplied by the said pump to the chamber 24 of the cylinder 20, and therefore the velocity of the feeding movement depends on the position of the gear wheel 6. The liquid is forced from the chamber 25 through the pipe 27 and the chamber 43 to the pipes 34, 39 and the tank 38. While the lower pump thus transmits feeding movement the upper pump runs idle, the liquid delivered therefrom through the pipe 32 being immediately returned through the pipes 35 and 39 to the tank 38. It will thus be apparent that the velocity of the feed may be regulated by shifting the gear wheel 6.

For returning the feeding mechanism the slide valve 29, 30, 31 is set into the position shown in Fig. 6. Now the lower pump runs idle, the liquid delivered therefrom and through the pipe 33 immediately returning through the pipes 36 and 39 into the tank 38. The pressure fluid of the upper pump flows through the pipe 32, the chamber 44 and the pipe 27 into the right hand chamber 25 of the cylinder 20, so that the piston 21 and the parts connected therewith are shifted to the left. The fluid contained within the chamber 24 is returned to the tank 38 through the pipe 26, the chamber 61 and the pipes 37 and 39. It will be understood that the velocity of the return movement is always the same and that it is independent of the position of the gear wheel 6.

The slide valve 29, 30, 31 is operated by means of the lever 45 which is adapted to be engaged by stops 46 and 47 provided on the head 23, the said stops being set so that the valve is reversed at the ends of the strokes.

FRITZ EGERSDÖRFER.

PUBLISHED	**F. EGERSDÖRFER**	**Serial No.**
MAY 11, 1943.	GEAR PUMPS	**429,040**
BY A. P. C.	Filed Jan. 31, 1942	2 Sheets-Sheet 1

Fig. 1

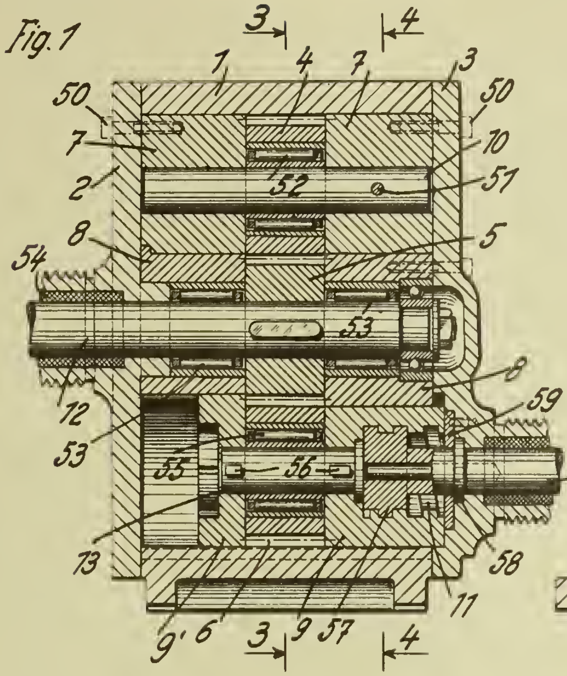


Fig. 3

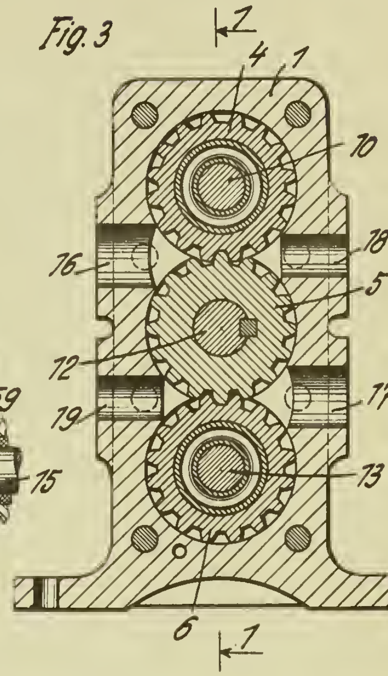


Fig. 2

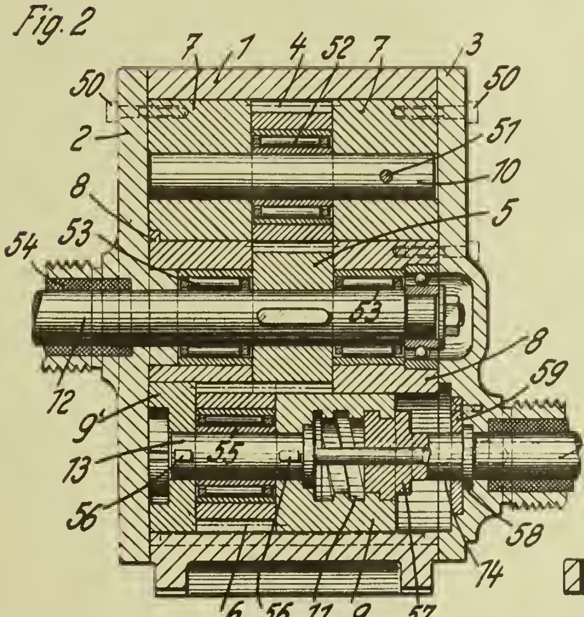
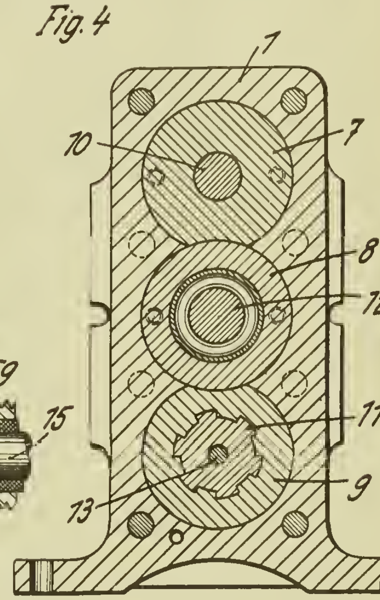


Fig. 4



Inventor:
Fritz Egersdörfer
by Franz Reinhold
Attorney.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

F. EGERSDÖRFER
GEAR PUMPS
Filed Jan. 31, 1942

Serial No.
429,040
2 Sheets-Sheet 2

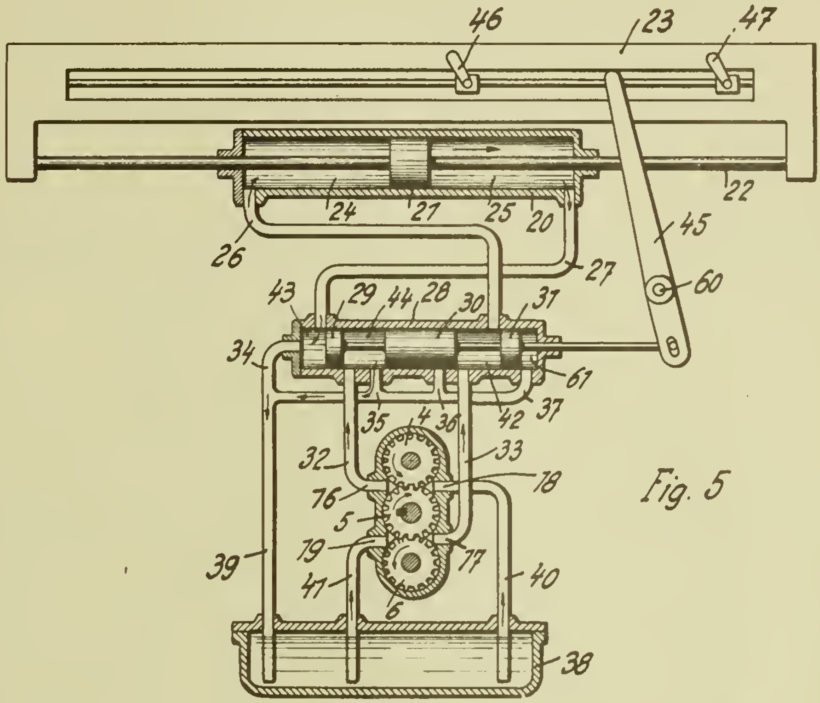


Fig. 5

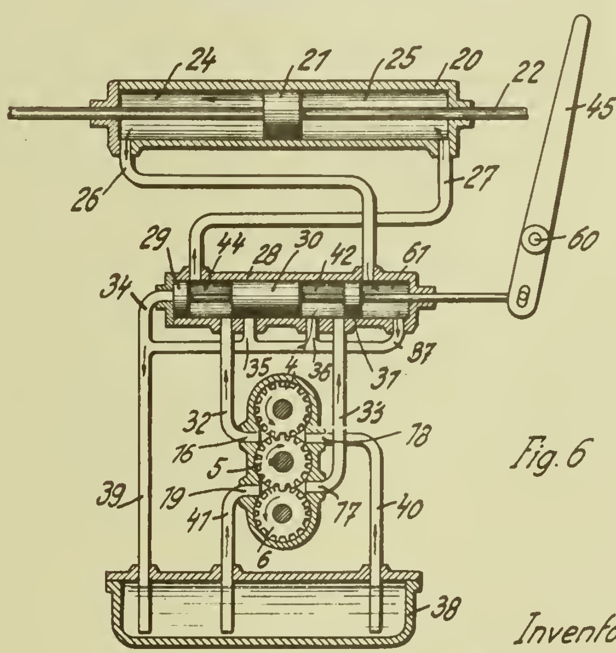


Fig. 6

Inventor:
Fritz Egersdörfer
by [illegible]
Attorney.

Published May 11, 1943

Serial No. 430,304

ALIEN PROPERTY CUSTODIAN

PRODUCT FOR OVERCOMING THE CRYPTOGAMIC DISEASES OF PLANTS AND ITS MANUFACTURING PROCESS

Henri Bernat, Bordeaux, France; vested in the Alien Property Custodian

No Drawing. Application filed February 10, 1942

It is known to use copper ammonide for overcoming the cryptogamic diseases of plants. The said process has been repelled because the copper apprayed upon the parts to be protected is entrained by rain and dew, so that the length of efficiency of the ammonide is rather restricted.

On the other hand it is known that copper ammonide dissolves cellulose.

The present invention is based upon the use of the said last feature for preventing the entrainment of copper by rain and dew.

The present invention has for its object a product for overcoming the cryptogamic diseases of plants, which is constituted by a mixture of copper ammonide and of an adhesive material and particularly by a dissolution of cellulose in copper ammonide, the said dissolution being advantageously additioned with colloidal, plastic, adhesive or viscous elements.

In order to obtain the said cellulosic dissolution, cellulose is introduced in the ammonide, the said cellulose is dissolved, thus obtaining a liquid which is more or less thick according to the amount of cellulose being added. The dissolution of cellulose is facilitated by grinding.

As colloids or plastic materials colloidal clay can be mentioned, the said clay being sufficiently ground for remaining suspended in the liquid to be sprayed, such materials being for instance kaolin, kieselguhr which further have the advantage of leaving if necessary after addition of a dye,—upon the leaves visible traces which enable to control the reality and the rate of the treatment.

In order to obtain a given viscosity, fat materials and particularly a small proportion of rosin oil can be used, the said materials remaining incorporated in the ammonide in the form of ammonia soap.

When the said product is to be used, be it under the form of paste or of a liquid, it is mixed to a more or less great amount of water, according to the copper content desired for the liquid to be sprayed. It will be noted that the cellulose is suspended in the form of very light flakes. The said flakes are very easily dispersed in a persistent way by stirring and will be sprayed on to the vegetal parts to be protected simultaneously with the liquid.

A short time after appraying, the ammonia, then the water evaporate and the copper remains sticked to the leaf, under various combinations. The cellulose and the plastic materials (clay, etc.) form a kind of protective varnish or coating. The ammonia soap imparts a given viscosity the said coating and loses by evaporation most of the ammonia which it contains.

HENRI BERNAT.

Published May 11, 1943

Serial No. 433,077

ALIEN PROPERTY CUSTODIAN

BOAT

Kalman Farkas, Budapest, Hungary; vested in the Alien Property Custodian

Application filed March 2, 1942

The present invention relates to new and useful improvements in boats and has for its primary object to provide, in a manner as hereinafter set forth, a vessel which is capable of great speed and which includes novel propelling means.

Other objects of the invention are to provide a boat of the character described which will be simple in construction, strong, durable, safe and which may be built and operated at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawing wherein like characters of reference designate corresponding parts throughout the several views, and wherein:

Figure 1 is a view in side elevation of a boat constructed in accordance with the present invention.

Figure 2 is a view in vertical longitudinal section through the boat.

Figure 3 is a cross-sectional view, taken substantially on the line 3—3 of Figure 2.

Figure 4 is a fragmentary view in section, taken substantially on the line 4—4 of Figure 2.

Figure 5 is a cross-sectional view, taken substantially on the line 5—5 of Figure 1.

Figure 6 is a detail view in section, showing the mounting of one of the rotatably adjustable propeller blades on the hull.

Referring now to the drawing in detail, it will be seen that the embodiment of the invention which has been illustrated comprises a hull **1** of suitable dimensions and material, said hull being in the form of a streamlined shell. Fixed in the forward end portion of the hull **1** is a centrally located longitudinal tubular shaft **2**. The rear end portion of the shaft **2** is fixed in a suitable support **3** in the hull **1**. The forward end portion of the shaft **2** is mounted in the nose **4** of the hull **1**. Rotatably mounted in the rear or stern end portion of the hull **1** is a tubular shaft **5** which is aligned with the shaft **2**. Mounted on the shafts **2** and **5** is a pendulous enclosure or cabin **6** the walls of which are spaced from those of the hull **1**. The forward end of the cabin **6** is journaled on the shaft **2** At its rear end, the cabin **6** is fixed to the shaft **5**.

A power plant **7** in the cabin **6** drives the shaft **2** through gears **8**. In this manner the hull **1**, to which the shaft **2** is fixed, is rotated about the pendulous cabin **6**.

Rotatably mounted on the hull **1** are variable pitch propeller blades **9**. As best seen in Figures 1 and 2 of the drawing, the propeller blades **9** are arranged spirally on the hull **1** and also to define longitudinal rows. Fixed on the inner end portions of the stems **10** of the propeller blades **9** are crossheads **11**. Rods **12** connect the crossheads **11** of the blades **9** comprising the longitudinal rows for adjusting said blades in unison.

A support **13** is provided in the hull **1** for the forward portion of the tubular shaft **5**. Slidable on the tubular shaft **5** is a sleeve **15** which passes through the support **13**. On the forward end of the sleeve **15** is a flange **16**. A hand lever **17** in the cabin **6** is operatively connected to the tubular sleeve **16** by a yoke **18** which is engaged with the flange **16**. It will be noted that the construction is such that the sleeve **15** may rotate relative to the cabin **6** with the hull **1**. Rods **19** connect the rear end of the sleeve **15** to the adjacent propeller blades **9**.

Extending through the tubular shaft **5** is a periscope **20**. Also extending through the tubular shaft **5** and communicating with the cabin **6** is a ventilator **21**. Mounted on the stern of the hull **1** is a rudder **22**. A hand lever **23** in the cabin **6** actuates the rudder **22** through the medium of a rod **24**, said rod being operable in the tubular shaft **5**. A lining or bushing **25** is provided in the tubular shaft **5**. A closure **26** on the forward end portion of the lining **25** closes and seals the forward end of the tubular shaft **5** around the members **20**, **24**, etc., for preventing water from entering the cabin **6**. Also extending through the tubular shaft **5** is a water discharge tube **27**.

It is thought that the operation of the boat will be readily apparent from a consideration of the foregoing. Briefly, the cabin **6** is suspended by gravity in a vertical position. As hereinbefore stated, the power plant **7** rotates the hull **1** through the gears **8**, the shaft **2**, etc. When the hull **1** is thus rotated said hull is caused to move forwardly through the water by the blades **9**. By moving the sleeve **15** longitudinally on the tubular shaft **5** through the medium of the hand lever **17** the pitch of the blades **9** may be adjusted as desired. Also, if desired, the sleeve **15** may be connected to a suitable governor driven by the power plant **7** thereby automatically changing the pitch of the propeller blades **9**. A door **28** is provided in the top of the cabin **6** to which access is had through the medium of a ladder **29**. The hull **1** is provided with a plurality of doors **30**.

It is believed that the many advantages of a boat constructed in accordance with the present invention will be readily understood and although a preferred embodiment of said boat is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

KALMAN FARKAS.

PUBLISHED	K. FARKAS	Serial No.
MAY 11, 1943.	BOAT	433,077
BY A. P. C.	Filed March 2, 1942	2 Sheets-Sheet 1

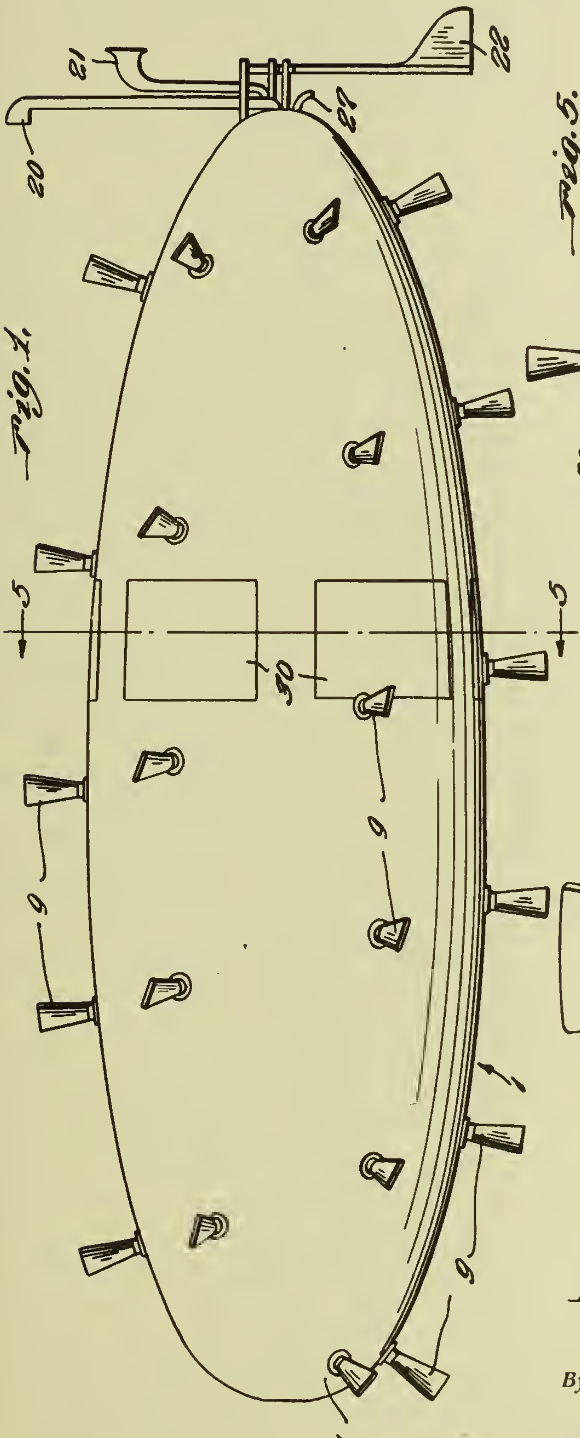


Fig. 4.

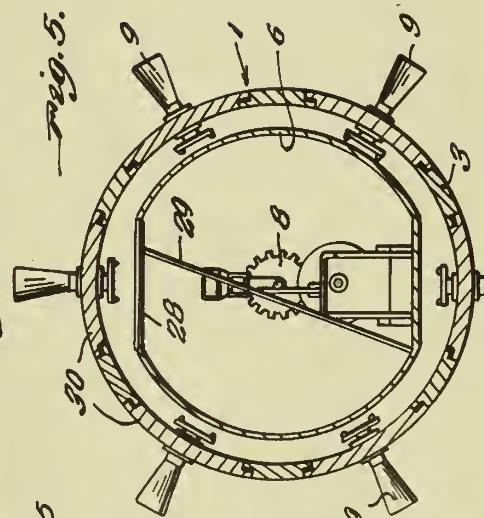


Fig. 5.

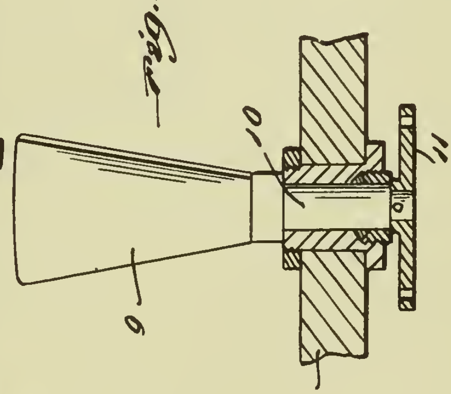


Fig. 6.

Inventor

Kalman Farkas

By Clarence A. O'Brien
and Harvey B. Jacobson
Attorneys

PUBLISHED	K. FARKAS	Serial No.
MAY 11, 1943.	BOAT	433,077
BY A. P. C.	Filed March 2, 1942	2 Sheets-Sheet 2

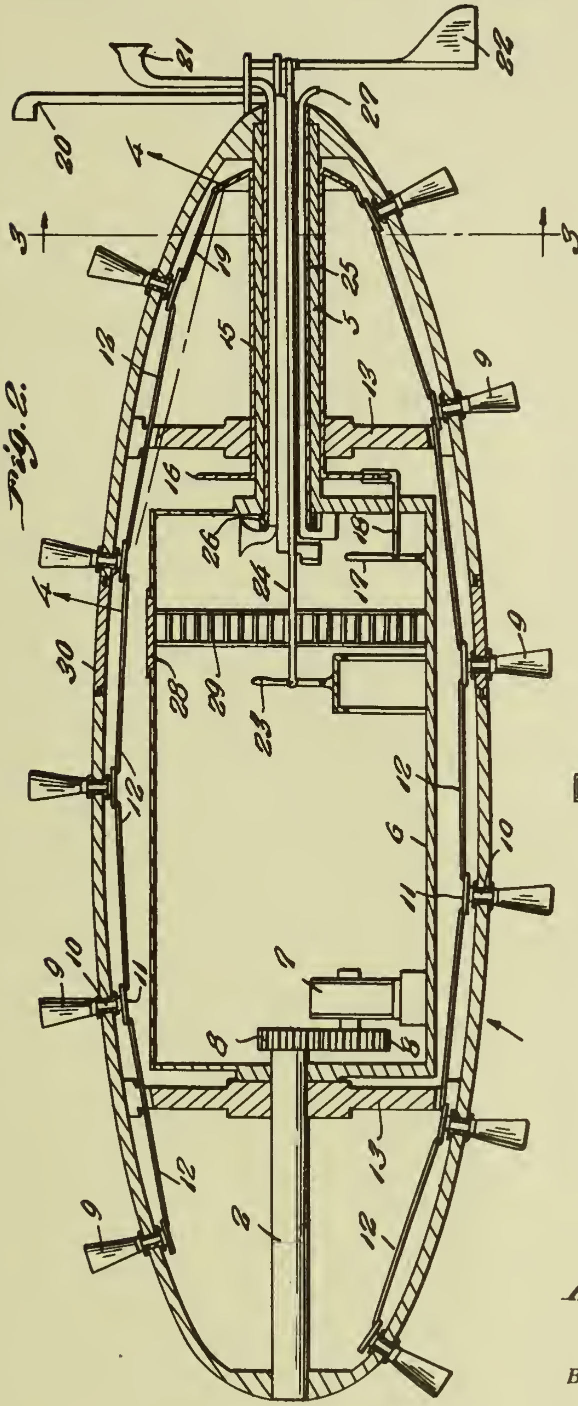


Fig. 2

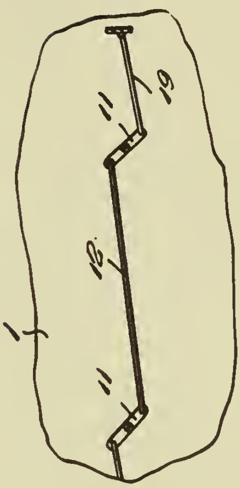


Fig. 4

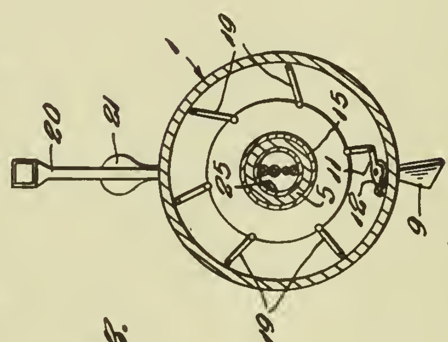


Fig. 3

Inventor

Kalman Farkas

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Published May 11, 1943 Serial No. 433,206

ALIEN PROPERTY CUSTODIAN

PROCESS FOR INCREASING THE RETENTION CAPACITY OF THE SEALING SURFACE OF ARTIFICIAL PORCELAIN TEETH

Paul Jean Jacques Gonon, Paris, France; vested in the Alien Property Custodian

Application filed March 3, 1942

The present invention relates to porcelain artificial teeth and more particularly to teeth which are to be secured onto a supporting part composed of a plastic material shaped by contact with said teeth, or to be secured by sealing onto any denture base whatsoever, and the present application is a continuation-in-part application of our application Serial No. 286,126 filed July 24th, 1939.

It is known that the securing of such teeth onto their denture base is generally obtained by metal pins one extremity of which is embedded in the body of the tooth, or by rentention holes of relatively large sizes provided in said body, or again by sliding means adapted to a metallic stud or tenon integral with the denture base. In order to avoid the well known inconveniences inherent to these various systems, a method for forming retention means on the retention surface of porcelain teeth has already been proposed, which method consists in applying onto this retention surface a mixture of tooth porcelin powder, of ground cork, of a powder of a ceramic substance which increases the fusing point of the porcelain and prevents glazing, and of a sticking substance such as an aqueous solution of soda silicate, then in heating the tooth structure with the said mixture to the fusing point of the tooth porcelain. As a result of this heating, the cork contained in the said mixture burns and provides on the retention surface of the tooth numerous undercuts, which condition gives this surface a roughness the object of which is to ensure a firmer attachement of the tooth on its supporting part. However, with this method only imperfect results can be obtained. The above defined mixture which is applied to the retention surface of the tooth constitutes a conglomerate in which the particles of ceramic material having a high fusing point are completely enveloped and in which the undercuts resulting from the combustion of the cork particles form small cavities more or less spherical, ill-fit for ensuring a good retention of the tooth by the supporting part and which are distributed haphazardly, the only cavities which can have a useful retention power being those which are superficially widely open. On the other hand, the internal cavities resulting from the combustion of the cork particles contained throughout the layer of the mixture applied onto the retention surface of the tooth play no part in the retention and have a harmful effect by rendering this layer extremely porous and by consequently reducing its own resistance to a considerable extent, so that there are great chances that the breaking away of the tooth will occur rather easily by breakage of this layer. Moreover, this porosity is particularly unsanitary due to the fact that is is subject to septic infiltrations.

The object of the present invention is a process which presents none of the above mentioned inconveniences and which allows to obtain, on the retention surface of artificial porcelain teeth anchoring shapes presenting counter-draught and capable of ensuring a very fast sealing of the teeth on their supporting parts and the proper resistance of which is very high while being, at the same time, intimately and securely soldered to the body of the tooth.

The process according to the invention consists in coating the retention surface of the tooth with a binding substance and in sprinkling the so coated surface with particles of ground alumina, the in subjecting the tooth to a firing operation.

Thus, teeth are obtained—after firing—the surface of which presents, in that part which is provided with alumina particles, asperities in proportion to the sizes of the alumina particles utilized, which condition obtains, by means of sealing, a considerably increased retention capacity. Ground alumina particles have in general very irregular and ragged forms and, thanks to the fact that their distribution on the retention surface of the tooth takes place by sprinkling onto the binder applied before hand on this surface, they are held fast, only by their base, in most cases, in the tooth porcelain and are elsewhere completely free and exposed. These particles thus present asperities which constitute so many anchoring points for the sealing substance, especially for the plastic material constituting the tooth support. Moreover, an excellent soldering of the alumina particles to the porcelain of the tooth is observed, which may presumably be explained by the fact that the alumina is superficially attacked in the presence of heat by the silicates entering into the composition of the porcelain.

Practically, the process according to the invention may be applied either to porcelain teeth in a green state, in which case the baking occurring after sprinkling of the alumina powder, corresponds to the normal baking of the tooth, or to porcelain teeth already baked, in which case the teeth are subjected after sprinkling of the alumina powder to a second baking carried on under the conditions defined hereafter.

In the case where the teeth are in green state it is possible to use, as a binder, a substance possessing an agglutinating power at the ordinary temperature, the function of this substance being only to ensure a sufficient adherence of the alumina particles to the retention surface of the tooth during the handling which takes place between the sprinkling of the alumina particles and the firing operation during which the alumina particles will be soldered to the porcelain of the tooth. It is desirable that the adhesive substance utilized possess a good agglutinating power, that it preferably present a consistency which will per-

mit its laying on by means of a brush and that it does not dry too much, or that it does not dry at all if possible, in order that its agglutinating power be maintained between the moment when the said substance is applied onto the retention surface of the tooth and the moment when the sprinkling of the alumina particles takes place. Glue for example is an agglutinating substance which is particularly satisfactory with regard to those conditions. Pitch, dextrine, starch, alginates and the like may be also used with advantage.

In the case where the treated teeth are already baked, it is desirable to add to the binder applied on the retention surface of the tooth a small quantity of ceramic material having a fusing point below that of the tooth porcelain and the fusing of which, during the final firing operation, will ensure the soldering of the alumina particles to the procelain of the tooth. The final firing is then carried on at a temperature sufficiently high to fuse the ceramic material contained in the binder but not sufficiently high to fuse the tooth. The said ceramic material may be constituted for example by porcelain powder of substantially the same composition as the tooth porcelain but the fusing point of which is slightly lowered by the addition of an appropriate flux. Despite the fact that the addition of such a ceramic material is not absolutely indispensable in the case where the treated teeth are in a green state, it is also possible to have recourse to this addition in this case, for it facilitates the obtention of a better soldering of the alumina grains to the porcelain of the tooth.

The alumina utilized for putting the invention into practice may notably be natural or artificial fused alumina, for example corundum. The alumina particles are obtained by grinding. Practically, it is possible to use alumina particles passing through sieves ranging from N° 43 (corresponding to grain sizes of 400 to 1410 microns) to N° 220 (corresponding to grain sizes of 25 to 90 microns). The best results seem to be obtained with particles passing through sieves ranging from N° 43 to N° 100 the optima sizes for these particles appearing to be between 300 microns and 720 microns (sieve N° 60). As far as the shape of the alumina particles is concerned it seems desirable, in order to carry out the process according to the invention, to choose particles having a rather elongated form. It is then possible, during the sprinkling of these particles onto the retention surface of the tooth which has previously been coated with a binder, to orient the said particles by means of a magnetic field for example, so that these may be anchored to the surface by their most narrow base, which condition allows to obtain asperities which project more substantially out from the retention surface of the tooth. On the abrading substance market can commonly be found alumina particles ground to all sizes fit for use in carrying out the invention as well as chosen particles which, for any given sieve number, can be of an elongated or short shape.

In all cases the fastness of the seals obtained with teeth treated according to the invention is quite remarkable, the asperities presenting counter draught and formed by the alumina particles constituting a multiplicity of anchoring points by which the teeth are effectively held by the hardened rubber or other supporting material. For flat teeth, for example, the firmness of such a seal is superior to that obtained by means of one or two metal pins which condition allows the manufacture of teeth of this type without metal pins and allows in addition the space occupied by the invisible part of the tooth to be reduced to a minimum. For molar teeth, the effectiveness of the seal obtained thanks to the invention allows to do away with metal pins and encumbering geometrical retentive forms, habitually utilized and allows to give substantial draught to the central hole which may go as far as the complete disappearance of this hole in the case of low teeth. On the other hand it has also been observed that with regard to teeth manufactured according to the invention the withdrawing of the plastic material constituting the denture base, and vulcanite in particular, practically no longer takes place at the level of the retention surface of the tooth, the plastic substance remaining intimately bound to this surface. The hollows habitually created by this withdrawing and which lend themselves to infiltrations and retentions of putrescible substances are thus avoided which condition leads to an important progress from a sanitary point of view.

In the appended drawing, embodiments of the invention are represented. In this drawing: Fig. 1 is a sectional view of a flat tooth secured on a prosthesis, only a part of which is represented; Fig. 2 is a similar sectional view of a molar tooth; Fig. 3 a large scale fragmentary sectional view of the retention surface of the tooth treated according to the invention.

In the case of Fig. 1, *a* is a flat porcelain tooth secured on a denture base *b* of hardened rubber for example. According to the invention, on the retention surface *c* of the tooth *a* are soldered alumina particles *d* between which the hardened rubber constituting the denture base *b* penetrates. In the large scale section of Fig. 3 the binding layer applied onto the retention surface *c* of the tooth can be seen at *e* the alumina particles *d* having been distributed by sprinkling onto the said retention surface. These particles are thus enveloped only at their base of contact with the surface *c*. The contours by which the particles *d* are represented in Fig. 3 correspond to some of the ragged forms which may be observed by a microscopic examination of these particles.

In the embodiment of Fig. 2 the molar tooth is sealed onto a denture base *c* composed of hardened rubber for example by means of surfaces *h*, *i* provided with alumina particles *d* as in the preceding case.

Hereunder are examples of binding compositions which may be utilized according to the invention to coat the retention surface of the teeth before sprinkling with alumina particles:

Example 1

For treating a green porcelain tooth baking at 1350° C, a mixture is used as a binder, which mixture is obtained by intimately mixing:

	Grs.
English glue	10
Finely divided felspar of the same composition as that of the one entering into the composition of the tooth porcelain	8
Calcium carbonate	0.4

If the mixture thus obtained is too thick to be laid on by means of a brush, it may be rendered more fluid by heating in a water bath, or by diluting it with a few drops of castor oil. After applying a coating of this mixture onto the retention surface of the tooth, corundum powder passing

through a N° 60 sieve is sprinkled onto this surface, and the tooth is then baked in the usual way.

Example 2

For treating an already baked tooth, the same mixture as in the preceding example is used but in which the addition of calcium carbonate is increased to 0.8 gr. After applying a coating of this mixture onto the retention surface of the tooth and sprinkling corundum powder thereon, the tooth is fired at about 1280° C.

PAUL JEAN JACQUES GONON.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

P. J. J. GONON

PROCESS FOR INCREASING THE RETENTION CAPACITY OF THE SEALING SURFACE OF ARTIFICIAL PORCELAIN TEETH

Filed March 3, 1942

Serial No.

433,206

FIG. 1.

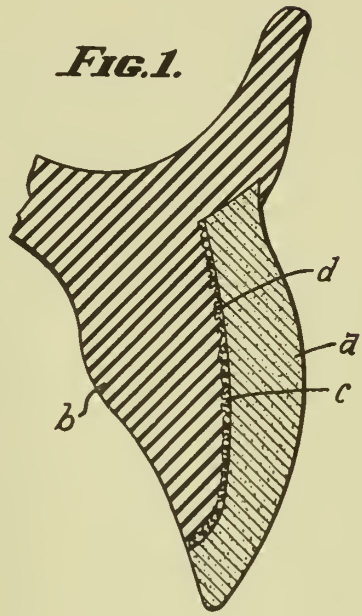


FIG. 3.

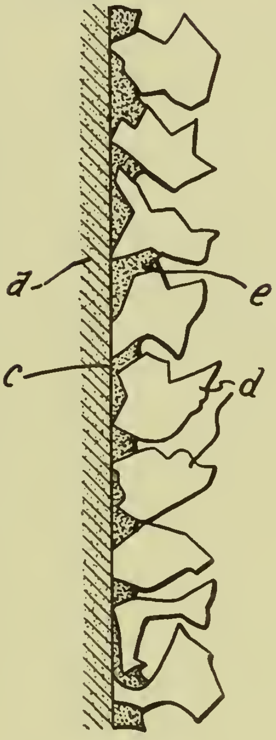
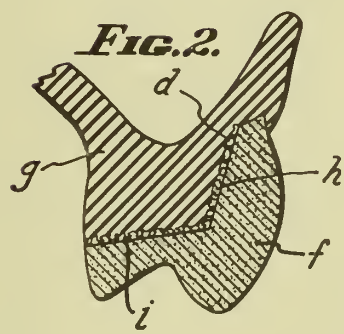


FIG. 2.



INVENTOR.

PAUL JEAN JACQUES GONON.

BY Allen & Allen

ATTORNEYS.

Published May 11, 1943

Serial No. 434,148

ALIEN PROPERTY CUSTODIAN

METHOD AND PRODUCTS FOR TREATING PLANTS OR PLANT PARTS

Emile Kolb, La Plaine Saint-Denis, France; vested in the Alien Property Custodian

No Drawing. Application filed March 10, 1942

For preventing and combating serial diseases of plants, i. e. those diseases which attack their parts above ground, it has already been proposed to employ ortho-hydroxy-quinoline in the form of quinolinium salts, particularly neutral quinolinium sulphate; to this end, said salts were deposited on the aerial parts by means of spraying, spreading or sprinkling, in form of solutions containing suitable wetting agents.

However, it has not been possible up to this time to secure the results reckoned upon in spite of the valuable properties of quinoline salts; as a matter of fact, owing to their being readily soluble in water, the salts are rapidly carried away, either when they are applied or by rains (thus even if they would be deposited by dusting), and have not a sufficiently protracted contact with the plants to be protected.

It has been endeavoured to insolubilise hydroxy-quinoline by blocking its phenol group; the metal quinolinates thus proposed (copper, iron, nickel and like quinolinates) did not lead to satisfactory results owing to their being much too insoluble in water.

Therefore, in commercial practice, ortho-hydroxy-quinoline and the salts thereof (quinolinium salts and quinolinates) have been chiefly employed for treatment of seeds, transplanted plants or portions thereof (for instance cuttings) and for internal treatment of trees. It has not been possible to secure satisfactory results in fighting diseases such as mildew, vine oidium and fruit-tree speckles.

It is a primary object of my invention to provide a method enabling of efficiently preventing or combating cryptogamic invasions or diseases of plants, by taking advantage in a novel manner of the known action of hydroxy-quinoline derivatives and salts thereof by causing the active substance to be set free gradually and continuously, said substance being deposited on the part to be treated in the form of a water-insoluble or sparingly soluble product.

It is known that hydroxy-quinolines, their homologues and derivatives having a free hydroxy group yield water-insoluble basic salts with alkaline earth bases. I have found that said salts are slowly decomposed by carbon dioxide and water vapour present in atmosphere with progressive disengagement of hydroxy-quinoline or like active substance.

Consequently, according to my invention, the method for protecting or treating plant parts or elements substantially comprises contacting the same with an alkaline-earth salt of a hydroxy-quinoline, a homologue or a derivative thereof the hydroxy group of which is capable of combining with the alkaline-earth metal (i. e. Ca, Sr, Ba, Mg, Zn). It should be understood that the term "alkaline-earth salt" refers both to neutral salts such, for instance, as

$$NC_9H_6—O—Ca—O—C_9H_6N$$

and to basic salts such for instance as $NC_9—H_6—O—Ca—OH$.

In actual practice, I generally prefer 8-hydroxy-quinoline from the commercial standpoint; however, 3-, 5-, and 6-hydroxy-quinolines are equally useful; among homologues and derivatives suitable for producing useful alkaline earth salts, I may mention, merely by way of examples, 5-methyl-6-hydroxy - quinoline, 5-methyl-8 - hydroxy - quinoline, 8-methyl-2-hydroxy - quinoline, 6-isopropyl-8-hydroxy quinoline, and 6-methyl-8-hydroxyquinoline sulphate, it being understood that the foregoing list should not be construed in a limitative sense; generally speaking, any soluble salt of hydroxy-quinoline capable of yielding the desired alkaline-earth salt through partial or complete double decomposition, for instance mineral acid salts such as sulphuric acid or hydrochloric acid salt, organic acid salts such as citric acid, benzene sulphonic acid, salicylic acid and like salts may be employed for producing useful alkaline earth salts.

For carrying out my method into practice, that is for contacting the alkaline-earth salts with the parts to be protected or treated it is possible to use the salts themselves or reagents capable of producing the same in situ; the salts may be produced before use or they may be formed at the time of use. In applying the salts or parent reagents on the plant parts, it is advisable to adjoint thereto auxiliary substances such as diluting, adhesive, wetting, filling and like agents and even insecticides, other anticryptogamic agents and so on. It will be obvious that either for producing the salts before or during application on plants or for forming them on the plants from parent reagents, the alkaline-earth base may be brought in admixture with the auxiliary substances, even as an impurity thereof, or as an auxiliary substance.

The salts or the parent reagents, admixed or not with auxiliary substances, can be applied by usual procedure such as spraying, sprinkling, coating, brushing, spreading, dusting and so on. The process is suitable for treating standing plants (aerial and underground parts), plants or plant parts which are transplanted or shall be

set, transplanted, grafted, etc. as well as for treating seeds; for the sake of simplicity, I shall refer in the claims solely to "treating plant parts" but the words are to be construed as including any and all of the above set forth possibilities.

The alkaline-earth salts as herein proposed have been found particularly efficient against all diseases of plants, both those which, like fruit-speckles, vine oidium, mildrew attack aerial parts and those which like rot attack underground parts.

The following examples which have no limiting character will show how my invention can be carried into practice.

Example 1

94 kg. of magnesium chloride (100 per cent) were dissolved in 500 litres of water and an alkaline base (sodium hydroxide, potassium hydroxide, ammonia) was added to set free magnesium hydroxide, then 145 kg. of hydroxyquinoline base were added and the whole was stirred at 60–70° C. until the reaction was completed. The reaction may be effected with non-equimolecular amounts of reagents.

The mixture was then filtered, washed and dried. The product thus obtained was finely powdered. It may be applied by dusting or made into a paste with water and sprayed on plants to be treated.

Example 2

350 g. of the product obtained in accordance with Example 1 were admixed with 100 litres of a thin adhesive and wetting paste of cryolithe or another insecticide or anticryptogamic product, and the mixture was used just as it was.

Example 3

2.08 kg. of 6-methyl-8-hydroxyquininoline neutral sulphate were dry mixed with 1 kg. of slaked lime, then 70 kg. of kaolin, wetting agents and adhesive agents were added thereto.

Example 4

2.600 kg. of 8-ethyl-3-hydroxy-quinoline hydrochloride, 30 kg. of lead, aluminum or calcium arseniate, 4 kg. of calcium hydroxide, barium hydroxide, strontium hydroxide, magnesium hydroxide or $Zn(OH)_2$, 4 kg of sodium α-butylnaphthalene-β-sulphonate, 3 kg. of caseine and 76 kg. of kaolin were dry mixed. The mixture was used either in dry form or in moist form. It may be stored in dry form or as a paste which may be dried.

Example 5

4 kg. of lime, 4 kg. of cellulose ligno-sulphite, 3 kg. of caseine and 86 kg. of cryolithe were admixed according to a dry or moist process; the mixture was treated with a solution of 2 kg. of 8-hydroxy-quinoline in an organic solvent such as alcohol. The mixture may be dried for recovering the solvent or used as such after suitable dilution.

It will be obvious that many changes may be brought in the above method without departing from the spirit of my invention; thus for example, when producing the alkaline-earth salts or when determining the amounts of reagents for generating said salts in situ, it is possible, when desired, to convert hydroxy-quinoline or related substances only partially into alkaline-earth salts.

It will further be understood that my invention comprises the novel compositions of matter constituted by anti-cryptogamic or like preparations including among their components either alkaline-earth salts of hydroxy-quinoline, homologues or derivatives of hydroxy-quinolines, or parent reagents for said salts.

EMILE KOLB.

Published May 11, 1943 Serial No. 434,625

ALIEN PROPERTY CUSTODIAN

PROCESS OF SOAKING ALL KINDS OF DRIED AND SALTED HIDES AND SKINS

Carl Riehs, Ludwigshafen-on-the-Rhine, Germany; vested in the Alien Property Custodian

No Drawing. Application filed March 13, 1942

This invention relates to a process of soaking all kinds of hides and skins in liquors, containing neutral-reacting phosphoric salts.

Hides, skins, and skins for fur are usually delivered to tanneries and fur dressers in dried or salted conditions and, before being worked, must be brought in a condition similar to that of fresh hide, especially as far as the content of water is concerned. This is the purpose of the soaking process.

Soaking of dried hides and skins meets with certain difficulties, the dried collagen absorbing water but slowly. Long soaking periods, however, especially during the hot season, involve the risk of putrification caused by adhering dirt and leading to a loss of hide substance and a considerable reduction of the quality of the skins.

Since in many cases soaking with water alone does not satisfy, the addition of acids or alkalis has been proposed, which swell the hide and thus facilitate the absorption of water. Alkaline soaking has proved particularly effective, since by its fat-saponifying action it promotes wetting.

However, not only a suitable water content of the hide, but also its swelling condition is of great importance for the quality of the finished product. A suitably soaked hide should be in that special fallen condition by which it is characterized immediately after skinning. Acid or alkaline soaking, however, do not lead to the desired result and, moreover, their application includes certain risks consisting in the fact that acids and alkalis attack the hide, the result whereof may be a loss of hide substance. For these reasons less aggressive chemicals have been searched for, which at a neutral reaction would allow to obtain the desired soaking effect. Thus, the application of wetting agents with neutral reaction, salts of aromatic sulphonic acids, ammonium rhodanate etc. for soaking purposes was arrived at. Finally, slightly alkaline solutions of enzyme have been introduced for soaking fur skins. The desired accelerating action of these compositions is, however, very limited.

Now, I have found that absorption of water can also be accelerated without swelling the hides, by soaking them in neutral or almost neutral-reacting liquors, the pH-range of which is between pH 5 and pH 8, preferably, however, between pH 6 and pH 7, these liquors being obtained by dissolving salts of polymeric acids, the solution of which in water is neutral or slightly acid. Such polymeric acids are for instance the iso- and heteropolymeric acids, such as hexa- or paratungstic acid, hexavanadium acid, as well as the neutral or slightly acid solutions of polymeric acids with phosphates, for example compounds from phosphoric acids and hexatungstic acid in the molecular proportion of 1:0,5 up to 1:2; further the polymeric acid selected from the group of condensed, aromatic sulphonic acids as obtained by sulphonating aromatic hydrocarbons or their oxy-compounds in usual way and subsequently condensing them with aldehydes. Finally, the substances produced by condensation in alkaline medium belong also to this class of polymeric acids.

Example 1.—For soaking dried hides and skins, a solution of 1 g of paratungstate $Na_5HW_6O_{21}$ per litre of soaking liquor is used.

Example 2.—A solution of sodium molybdate, having been adjusted to a pH-value of about 7 by means of hydrochloric acid, is added to the soaking water in an amount of 1 to 2 g of molybdate per litre of soaking liquor.

Example 3.—A solution of 1 to 2 g per litre of soaking liquor of a phosphoric tungstate of the formula $2Na_2O.1P_2O_5.12WO_3$, having been adjusted to pH 6.5 by addition of acid, is used for soaking.

Example 4.—1000 g of phenol or cresol and 1000 g of concentrated sulphuric acid are heated to 100–120° C and after cooling stirred with 500 g of 40% formaldehyde. The condensation product is completely neutralized by addition of sodium hydroxide.

Example 5.—2 gram molecules of phenol and 1 gram molecule of formaldehyde are condensed at the reflux-cooler under addition of concentrated hydrochloric acid. The product is heated in vacuum as long as free phenol is present, then sulphonated at 100° C with 1 gram molecule of concentrated sulphuric acid upon 1 gram molecule of phenol, and subsequently completely neutralized with sodium hydroxide.

CARL RIEHS.

Published May 11, 1943

Serial No. 435,159½

ALIEN PROPERTY CUSTODIAN

SADDLE SUPPORT FOR CYCLE

Michele Grivetto, Turin, Italy; vested in the Alien Property Custodian

Application filed March 18, 1942

This invention relates to a device for supporting cycle saddles, which allows of small displacements of the saddle in a substantially horizontal plane, so that the saddle may follow and suit the movements performed by the cyclist in riding.

According to this invention, the angular displacements of the saddle take place against the action of resilient means which act at the same time as shock absorbers and tend to return the saddle to its normal position in alignment with the frame, suitable means being provided for limiting the width of the angular displacement of the saddle.

According to a preferred embodiment of this invention, the saddle pillar, which is fittted into the saddle socket, encloses a rod carrying on top the saddle that can oscillate about its axis with respect to the saddle pillar through the angular width required for the abovementioned purpose.

The accompanying drawing shows by way of example a construction of the object of this invention.

Figure 1 is an elevation of the saddle support,
Figure 2 is a longitudinal section and
Figure 3 shows a modification.

1 denotes the saddle pillar closed at its ends by the top and bottom discs 2 and 3, respectively, which in the construction shown form at the same time the inner race of a thrust and radial ball bearing, the outer race of which is denoted by numerals 2′ and 3′, respectively. 4 denotes a head carrying the saddle fixed thereto, which extends into a rod 5 of smaller diameter reaching within the pillar 1 and having a screw-threaded end for receiving the nut 6 by means of which the head 4 and rod 5 are fixed to the pillar 1, with respect to which the rod 5 and tube 4 may therefore freely rotate on balls.

In the construction shown, the resilient means is constituted by a rubber cylinder 7 forced on the rod 5, of which the ends are clamped between the disc 8, that cannot slide along the rod 5 by effect of the splint pin 9, and the disc 3. By tightening the nut 6, the rubber cylinder 7 is compressed in an axial direction, whereby the rubber cylinder expands and its peripheral cylindrical surface is compressed against the inner walls of the pillar 1. The small angular displacements performed by the rod 5 with respect to the pillar 1 produce a resilient deformation of the rubber cylinder 7, on an angular displacement of the rod in either direction, and the cylinder resiliently reacts against said displacement and damps vibrations. As mentioned above, resilient means of any kind may be used other than the rubber cylinder 7, such as volute or helical springs or the like.

In the modification shown in Figure 3, the device permitting small angular resilient displacements of the saddle, consists of a silentblock 10 applied to the armature 11 of the saddle and fittted on the saddle pillar of normal construction. In order to lock the saddle on the pillar, the inner sleeve 13 of the silentblock is expansible and the outer sleve 14 is cut and provided with lugs 15 for clamping the silentblock on the pillar 12.

MICHELE GRIVETTO.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

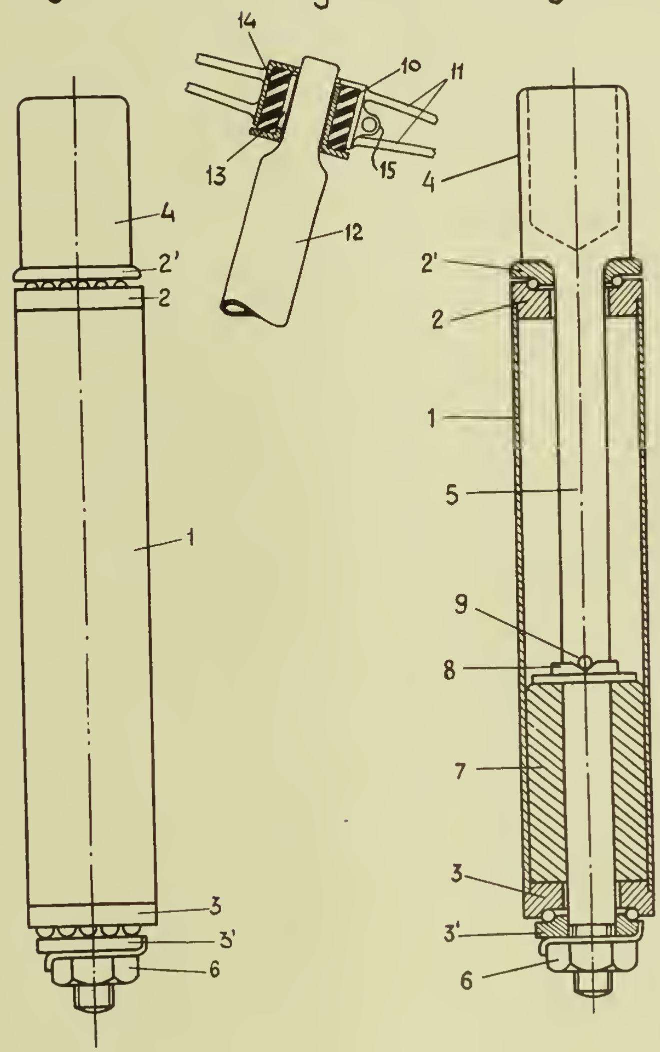
M. GRIVETTO
SADDLE SUPPORT FOR CYCLE
Filed March 18, 1942

Serial No.
435,159½

Fig. 1

Fig. 3

Fig. 2



Inventor:
Michele Grivetto
By
Young, Emery & Thompson
Attys.

Published May 11, 1943 Serial No. 436,541

ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF MOLDED PRODUCTS

Georges Passelecq, Paris, France; vested in the Alien Property Custodian

No Drawing. Application filed March 27, 1942

The idea has already been had of manufacturing mastics and cements called "antiacid," by using as an agglomerating agent sodium silicate in the presence of a catalyser causing the setting of the latter, such as, for instance, sodium fluosilicate, and a wetting agent. The sodium fluosilicate causes, as is well known, the decomposition of the sodium silicate with the formation of nascent silica and it is the latter which, once freed, combines with the silicious substances contained in the inactive powders utilized in the manufacture of these cements and mastics and ensures the agglomerating one to another of the various particles of matter. The wetting agent facilitates the preparation of the pastes, increases their fluidity and improves the adherence of finished cements and mastics.

These cements and mastics, which comprise, in practice, a high proportion of sodium silicate, are applied by means of a spatula or a trowel.

Now, it has been found, according to the present invention, that mixtures of this nature could be applied to the manufacture of molded products of high quality starting from pulverulent substances of diverse natures, by using particularly small proportions of sodium silicate. The invention ensures, notably, the obtention of molded products which have a high percentage of useful agglomerated substances and at the same time a strong reciprocal binding of their constituent particles. It allows, moreover, for the same molding pressure, the obtention of molded products presenting a compactness and consequently an apparent density which are higher than that of agglomerated bodies manufactured by most well known processes. Inversely, for the obtention for molded products of a given density, it offers the possibility of using a molding pressure substantially lower than pressures generally used in the agglomerating processes known up to now.

The process according to the invention is essentially characterized by the fact that the pulverulent mass to be agglomerated and molded is mixed with a solution of sodium silicate and with a substance capable of decomposing the latter thereby giving rise to the formation of nascent silica having the power to ensure the setting of the mixture, in the presence of a dispersing-wetting agent, and in that the mixture thus obtained is then molded.

The dispersing-wetting agent utilized in accordance with the invention diminishes the surface tension of the liquid and allows the uniform distribution, in an extremely thin layer, of the sodium silicate around all the particles of the substance to be agglomerated. Accordingly, by operating in the presence of a dispersing-wetting agent, the proportion of sodium silicate to be used in order to obtain a good agglomeration may be considerably reduced with respect to that which would be necessary were the mixture effected without the presence of such a dispersing-wetting agent. In general when using a sodium silicate solution at 36° Bé., this proportion may vary from 2 to 8% by weight with respect to the pulverulent mass to be agglomerated.

The reaction of decomposition of the sodium silicate may be, notably, as it is known "per se," a catalytic reaction, in which case the substance which is added to the pulverulent mass to obtain this decomposition plays the unique or principal part of a catalyser. To that purpose, it is possible to use such substances as, for instance, fluosilicates, fluotitanates, fluotungstates, fluozirconates of sodium or of potassium. In certain cases, which will be specified hereafter, it is also possible, to attain the same object to use impalpable silica freshly ground. To allow the use of the smallest possible quantity of catalyser, it seems desirable that the ratio

$$\frac{SiO_2}{Na_2O}$$

of the sodium silicate be at least equal to 3,2. However, it is preferable that this ratio do not exceed the value of 3,35 so as not to hinder the reaction giving rise to the formation of nascent silica.

A real stoicheiometric reaction may also be used by causing the flocculation of nascent silica by any reacting agent having a pH lower than that of the sodium silicate solution or containing or capable of liberating a molecule of free acid the acidity of which is at least equal to that of the silica. Along the same line of thought, it is possible to use, in order to obtain this reaction, bicarbonates or tricarbonates which, in the presence of water, give rise to free carbonic acid, or again, a sulphate, such as, for instance, aluminium sulphate which, in hydrolysing, produces sulphuric acid. It is also possible to use a sulphide capable of liberating, by hydrolysis, hydrogen sulphide which then acts as a weak acid, or an organic compound such as ortho or paratoluene sulphochloride which produces, by hydrolysis, one of several acids. Tests effected to this day seem to have revealed that, in the case of a reaction of stoicheiometric decomposition, the ratio

$$\frac{SiO_2}{Na_2O}$$

of the sodium silicate may be lowered to about 2,5.

Depending upon the case, the reaction of decomposition of the sodium silicate may be more or less rapid. It is advisable that it be sufficiently slow to allow the operator to effect the necessary handlings before the setting be complete, but sufficiently rapid that the agglomerating time is reduced to a duration that corresponds to industrial needs. According to necessities, a catalyser acting more or less rapidly will be chosen.

The binding, one to another, of the particles of the pulverulent substance to be agglomerated may, depending upon the case, result from the fixation of the nascent silica—formed by the decomposition of the sodium silicate—on to constituents elements of the substance to be agglomerated or contained in the latter or on to bodies introduced for this purpose into the substance to be agglomerated. Thus, for example, when the pulverulent substance to be agglomerated contains silicious bodies (free silica or silicate), it is probable that the freed nascent silica will combine superficially with these ingredients to form complex silicates which will ensure the desired agglomeration. If it is desired to agglomerate a metal in powder form or in the form of filings, it appears that the nascent silica resulting from the decomposition of the soda silicate forms with the metal or with the oxide of the surface layer a small quantity of silicate but sufficiently large to bind together the metallic particles.

If, on the contrary, the substance to be agglomerated does not contain bodies capable of constituting combination points for the freed nascent silica, it is possible to add to this substance bodies adapted to perform this function, for example, fine impalpable, freshly ground silica. In this case, the silica introduced in this state into the substance to be agglomerated appears to act the part, not only of combination points for the nascent silica, but also that of a decomposing catalyser for the sodium silicate. It is also possible—if it is desired to agglomerate a pulverulent fuel, for example, and although this measure may appear at first sight to be formally counter-indicated—to add to the latter a small quantity of cinders in order to cause the formation of combination points for the freed nascent silica.

By the process according to the invention, it is possible to agglomerate, generally speaking, substances not having a tendency to swell up, and particularly: ferrous metal filings (cast iron, steel, etc.) as well as non-ferrous ones (copper, bronze, zinc, aluminium, magnesium, etc.); inactive substances containing or mixed with free silica or a silicate; pulverulent ores or ores in the state of flottation powders or the like, with or without the additions necessary for their use in metallurgy, such as coal or reducing coke, substances for correcting slags in view of the elimination of impurities out of the finished metal, etc.; the dusts of blast furnaces or of furnaces for white metal, containing or not-containing coke dusts or other dusts; materials and products for refraction linings such as silica, silico-aluminous materials, zircon (zirconium silicate) etc.; graphite, treated or not, with or without the addition of other substances; mica in small pieces or in powder form; cold setting cements; fuels not having a tendency to swell, such as charcoal, certain coals and in general all carbonaceous materials distillated at a high or low temperature.

As wetting and dispersing agents for carrying out the invention, it is possible to use, for example, condensation and sulfonation products of aromatic hydrocarbons and of their derivatives with aldehydes, alcoyl—and aralcoyl—naphthalene sulphonates, sulphonated derivatives of fatty bodies, fatty alcohols, fatty acids, amides of fatty acids, amines derived from fatty acids, esters of fatty acids, sulphonation products of the residues resulting from the distillation of benzoic aldehyde, products soluble in water resulting from the action of ethylene oxide on substances insoluble in water and containing a reactive hydrogen, and other analogous products; substances of vegetal origin possessing dispersing and emulsioning properties such as licorice, saponin, products resulting from the hydrolysis of albuminoid substances, residual lyes resulting from the treatment of ligneous substances by means of sulfites.

The weight of the catalyser, if recourse be had to a catalytic reaction, and the weight of the wetting agent are (within certain limits) practically independent of the weight of sodium silicate employed. The more wetting agent and the more catalyser there are, within limits which are not excessive, the greater will be the density of the compressed substance obtained and the quicker will the setting take place. In general, a good agglomeration is obtained—in a period of time allowing manipulations, without having to hasten excessively—with 6% of catalyser and 2% of wetting agent calculated with respect to the weight of the sodium silicate at 36° Bé.

For carrying the invention into practice it is possible to mix the pulverulent substance to be agglomerated with the catalyser for setting, with the dispersing-wetting agent, and eventually with the substance destined to form the combination points for the nascent silica (if the substance to be agglomerated does not contain any by itself) and then add the sodium silicate.

By a molding or slubbing operation, or by other similar methods, the mixture thus obtained is shaped into molded objects according to the invention.

It will be advantageous to vibrate or pervibrate (slightly or much) the mixture before subjecting it to compression. Preferably vibrating machines having a vertical reaction will be used for this purpose.

If it is desired to obtain agglomerated bodies having a high density, it is advisable to so choose the granulometry of the pulverulent substances entering into the composition of the mixture to be agglomerated that the smallest particles be capable of filling to the greatest extent possible the empty spaces existing between the largest particles. It is to be noted that, thanks to the invention, the pressure necessary to the obtention of agglomerated bodies of high density is substantially reduced in comparison to that of heretofore known agglomerating processes. Thus it is that in many cases an ordinary hand-press, such as the one used for making brickets of slag mixed with a hydraulic binder, is sufficient.

Certain examples of carrying out the invention will now be given by way of indication.

Example 1

To obtain brickets of coke dust, a coke dust is taken the granulometry of which lies between extra fine and 2 m/m particles, and a weight of sodium silicate at 36° Bé equal to about 4 or 5% of the weight of the mass of coke dust is then added under the conditions predescribed as well as 6% of sodium fluosilicate and 2% of the dispersing wetting agent commercially known under

the name of "Diastersol NDS", with respect to the weight of the silicate. The mixture is then compressed into pellets by a pressure of 200 kgs/cm^2.

If the coke dust is wet, solid sodium silicate is used instead of a solution of this silicate for the water of the coke acts, in this case, as a dissolving agent. The silicate being little soluble in cold water, the difficulty is avoided by using a silicate which is richer in soda, but in this case, more catalyser is added, thus neutralyzing the excess soda which has facilitated the dissolving of the silicate.

Eaxmple 2

To agglomerate pig iron filings, these filings were mixed with 6% of sodium fluosilicate and 2% of sulphonated lauric alcohol, with respect to a weight of sodium silicate equal to 3% of the weight of the filings. Once a thorough mixture was effected, this mixture was stirred with the 3% of sodium silicate at 36° Bé, until a thorough mixture was obtained.

These filings were then compressed into small brickets by exerting a pressure of 500 kilos per square cm.

Example 3

Pulverized coal was agglomerated by mixing the coal dust with 8% of sodium silicate at 36° Bé with a quantity of sodium fluosilicate and of butyl-naphthalene sulphonate of sodium the total of which was equal to 6% of the weight of the sodium silicate.

The agglomerating pressure was 300 kgs/cm^2.

Example 4

Pulverulent anthracite was also agglomerated by using from 7 to 8% of sodium silicate at 36° Bé with respect to the weight of the anthracite and, in addition, 6% of calcium sulphide and 2% of the wetting agent commercially known as "Tibalene NAM" with respect to the weight of sodium silicate used. The same pressure as in the preceding example was used.

Example 5

The agglomerating of pulverulent flottation ores (of lead, zinc, iron and of other flottation ores) has been obtained with quantities of sodium silicate at 36° Bé varying from 3 to 8% with respect to the weight of the ore, the proportions of catalyser and wetting agent employed being respectively 6% and 2% with respect to the weight of the sodium silicate. The compression pressures were of the same value as those of the preceding example.

In the case where the ore was very wet it was possible to effect the agglomerating with solid sodium silicate under the same conditions as those in example 1) above concerning the agglomerating of coke dust.

Example 6

For agglomerating graphite, it has been proceeded, generally speaking, in the same manner, but by providing a preliminary preparation of the graphite. By means of any one of the well known processes, the graphite was transformed into graphitic acid which was washed and dried, then heated to red hot (about 1000° C) while being sheltered from air. The graphite swelled and assumed a volume about twenty-six times greater than before heating.

Once the swelling up was effected, the graphite was compressed into lozenges under a pressure of 50 to 100 kgs/cm^2 and the said lozenges were heated to about 500° C, which operation gave rise to a much less intensive swelling. The lozenges increased from one to three times in volume and were disintegrated to some extent but remained agglomerated nevertheless with a tendency to recover the foliated structure. Finally, by means of an easy crushing effect, the lozenges thus treated were ground and the powdered graphite thus obtained was mixed with 2 to 4% of sodium silicate at 36° Bé after having also been thoroughly mixed with 6% of sodium fluosilicate and 2% of the product sold under the commercial name of "quicktan", with respect to the weight of the sodium silicate.

Agglomerated bodies were then obtained by pressures which have varied between 25 and 1000 kgs per cm^2, these agglomerated bodies already having a very satisfactory hardness for a corresponding pressure of 25 kgs. The hardness increased as the pressure became higher.

Agglomerated bodies of graphite of this kind heated to 1000° to 1200° C have remained unchanged and appear to be appropriate for the fabrication of electrodes, retorts, muffles, crucibles and other objects of which graphite forms a part.

In all the cases where the catalyser utilized has been sodium fluosilicate, the setting was complete at a temperature of 15 to 20° C. after about six hours. In the case where the ambient temperature falls below 15° C the setting may be hastened by bringing the molded products in a stove to a temperature under 60° C until the inner temperature of the products attains about 40° C. Preliminary tests have permitted to determine the stoving time necessary in each particular case.

Example 7

The agglomerating of refractory substances has also been obtained in order to allow the substitution to dinas bricks (which contain a very high proportion of silica and a few percent of lime) of bricks containing practically only silica.

Quartz was taken and ground at the granulometry usually adopted for the fabrication of dinas bricks and was then agglomerated by means of sodium silicate, a catalyser and a wetting agent by using from 5 to 6% of sodium silicate at 36° Bé with respect to the weight of the silica, and on the other hand, 6% of catalyser and 2% of a wetting agent with respect to the weight of the sodium silicate. The mixing of these ingredients was effected along the general lines specified hereabove.

The mixture obtained was molded into brick shapes under a pressure of 500 to 2000 kgs/cm^2 and said bricks were subjected to a slow baking at a temperature gradually increased to 1500° C. The reaction which occurred in the course of the operation gave rise to the formation of nascent silica which united the quartz grains one to another whereas the volatile products of the catalyser progressively distilled due to the high temperature and escaped. As a result, the bricks obtained contained only silica grains, in the form of tridymite or criptobalite, soldered one to another, so to speak.

Example 8

Instead of using a fluosilicate as catalyser, it is also possible, as has been specified hereabove, to use freshly ground fine silica which also plays the part of an element permitting the combination of the nascent silica produced by the decomposition of the sodium silicate.

In this line of facts agglomerated bodies of zircona have been produced by thoroughly mix-

ing 100 parts by weight of chamot of zircona with 2.5 parts by weight of freshly ground silica passed through a sieve of 300 meshes and 0.1 part of Diastersol NDS; then by adding to this mixture 5 parts by weight of sodium silicate at 36° Bé. The mixture thus obtained was molded into bricks under a pressure of about 500 kgs per cm² and, in this case, the products were dried in free air for several days. Then the products were baked under the conditions usually adopted for the manufacture of refractory materials of this kind.

GEORGES PASSELECQ.

Published May 11, 1943 Serial No. 437,428

ALIEN PROPERTY CUSTODIAN

PISTON AND CYLINDER SYSTEMS

Paul Descourtis, Paris, France; vested in the Alien Property Custodian

Application filed April 2, 1942

The present invention relates to piston and cylinder systems of the kind in which the distributing means are provided in the form of edges and orifices carried in a suitable manner by the active surfaces of the piston and the cylinder. The invention is more especially, although not exclusively, concerned, among these systems, with pumps, and, in particular, fuel injection pumps and the like.

The object of the present invention is to provide a system of the type above mentioned which is better adapted to meet the requirements of practice than those used for the same purpose up to the present time.

According to a feature of the present invention, in a system of the kind above referred to, the distributing means are divided into at least two sets capable each of separately ensuring the working of the system, under similar or different conditions, the shifting from one to the other being obtained by a relative displacement, for instance a rotation of 180° about their common axis, of the piston and cylinder with respect to each other.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a diagrammatic axial sectional view of a piston and cylinder system for a pump, made according to a first embodiment of the present invention;

Fig. 2 is a diagrammatic transverse section corresponding to Fig. 1;

Fig. 3 is a view, similar to Fig. 1, showing this system in a different relative position of the elements thereof;

Fig. 4 is an axial sectional view of a system of the same kind made according to another embodiment of the invention;

Fig. 5 is a transverse sectional view corresponding to Fig. 4;

Fig. 6 shows the developement of the edges of the active surfaces of the piston of Figs. 4 and 5.

In the following detailed description, it will be supposed that the invention is applied to the construction of an injection pump, of the mono-cylindric or poly-cylindric type, to be used for the feed of an internal combustion engine. This pump will further be supposed to be of the kind in which the distributing means include edges or inclined surfaces, especially on the piston, variation of the pump output being obtained by a relative rotation of the piston and cylinder with respect to each other so as to modify the time at which the orifice or orifices coacting with these edges or inclined surfaces are opened and closed.

In particular, it should be reminded that, in existing pumps of this kind, the variation of the output of the pump can be obtained in three different ways, to wit: by advancing the beginning of the injection, or on the contrary by postponing the end thereof, or again by simultaneously varying the beginning and the end.

Now, it is known that some motors are preferably controlled by variations of the first kind, others by variations of the second kind, and others by variations of the third kind. It is therefore necessary to provide different interchangeable pistons corresponding respectively to these solutions.

An important object of the present invention is to obviate this drawback, and to this effect, according to a feature of the invention, the distributing means of the pump are divided into two or more distinct sets capable each of separately ensuring the distribution according to the respective types of variation of the output above mentioned. Shifting from one operation to the other is obtained by a relative displacement, for instance a rotation of given amplitude about their common axis, of the cylinder and piston.

In order to carry out this method of working, many specific embodiments may be provided by persons skilled in the art, especially according as one or several orifices are used, according to the particularly arrangement that is chosen for the distributing edges or inclined surfaces, and according to the value of the amplitude of rotation of the piston and cylinder with respect to each other, this amplitude being preferably chosen equal to 180° when two different conditions of operation are to be obtained, as it will be hereinafter supposed.

According to the embodiment of Figs. 1 to 3, I make use of two sets of distribution edges, superposed along the same generatrix of the piston, to wit:

a. a first set constituted, on the one hand by the edge **2** of the piston end face which, in this example, it at right angles to the piston axis, and, on the other hand by an oblique edge **3** of a notch **4** provided laterally in the periphery of the piston;

b. a second set constituted, on the one hand by an oblique edge **5**, which in this case is parallel

to edge 3 and corresponds to the same notch, and, on the other hand, by an edge 6 at right angles to the piston axis and corresponding to a second notch 7, itself perpendicular to the piston axis.

Pistons 4 and 7 are, in the known manner connected with the piston end corresponding to the face of the piston which compresses the fluid, the connecting passage being formed either in the lateral wall of the piston or on the inside thereof, as shown by the drawing (Figs. 1 and 3, conduits 16, 16^1, 16^2).

In cooperation with such a piston, I make use of a cylinder 8 provided with two orifices 9 and 10 located on diametrally opposed generatrices, these orifices being spaced apart in the axial direction of the piston and cylinder, in such manner that it is possible to bring either one of them (9, located at the upper part of the cylinder) into coaction with the first set of edges 2 and 3, or the other (10, located at the lower part of the cylinder) with the second set of edges 5 and 6.

The pump further includes:

On the one hand a control device, for instance of the cam type, for imparting rectilinear reciprocating displacements to the piston, and

On the other hand, means for producing relative rotations of the cylinder and piston with respect to each other about their common axis, so as to permit of varying the output of the pump by modification of the relative positions of the inclined edges with respect to orifices 9 and 10.

Such a system can operate in two different ways, respectively illustrated by Figs. 1 and 3.

It will be seen that, in one of these ways of working, corresponding to Fig. 1, the beginning of the injection remains invariable since it takes place when edge 2 comes to close orifice 9, that is to say always at the same time whatever be the angular position of the piston with respect to the cylinder. As the end of the injection takes place when oblique edge 3 uncovers said orifice, that is to say at a time variable in accordance with said angular position, the variation of output of the pump is obtained by varying the time at which the end of the injection takes place.

On the contrary, with the other way of working the pump, the beginning of the injection is variable, while the end is fixed.

In order to ensure the relative rotation of 180° which permits of passing from one working position to the other, I act either on the piston or on the cylinder.

For this purpose, I will merely, in some cases, act directly and manually upon the parts in question. For instance if it is desired to modify the working position of the cylinder, I remove said cylinder as it is customary to do when a part of the pump is to be examined or changed, after which said cylinder is refitted in an angular position at 180° from the preceding angular position.

But it may be advantageous, in some cases, to provide means for controlling from a distance the working position of the parts in question, which permits, in particular, simultaneously to act on the pistons or cylinders of several pump units.

These means may have their elements at least partly in common with elements of the means for varying the output of the pump.

They might further be used for adjusting the injection timing. Supposing for instance that said means act on the cylinder, by turning the latter through an angle of 180°, they might be made in such manner as to permit of effecting an initial adjustment of each of the two working positions, this adjustment producing a modification of the injection timing.

Finally, it goes without saying that suitable feed conduits are provided for supplying fuel to that of orifices 9 and 10 which is chosen.

In Figs. 1 to 3, which correspond to an embodiment in which the shifting from one of the ways of operation to the other is obtained by a rotation of 180° of the cylinder, the feed is ensured through a single conduit 11, of suitable section for enabling it to coact as well with one as with the other of said orifices, but separately.

If the shifting from one operation to the other is obtained by a rotation of the piston, I may have recourse to two conduits located at the level of the two orifices. I might also, in both cases, have recourse to a conduit surrounding the cylinder.

Instead of making use of two orifices as shown by Figs. 1 to 2, I may provide a single one, for instance by placing the two sets of inclined edges in suitable angular relation to each other, as shown by Figs. 4 to 6.

According to this embodiment, and supposing, for the sake of explanation, that the piston is divided into two portions by an axial plane, I provide, on one side of this plane, edges 2 and 3 analogous to those above described with reference to Figs. 1 to 3, with a notch 4 analogous to that disclosed by said Figs. On the other side of said axial plane, I provide, on the one hand, an upper oblique edge 5 symmetrical to edge 3 with reference to said plane, and which may be constituted by a bevelled edge of the piston end, and, on the other hand, a lower edge 6, with a notch 7, said last mentioned edge and notch being perpendicular to the axis of the piston.

It will be readily understood that these two sets of edges can coact, one or the other, with the same orifice 9, thus producing two different ways of working as above explained.

The switching from one to the other can take place, in this case also, either by acting on the piston (as shown by the drawing, orifice 9 being in this disclosure fed through a lateral conduit 11) or by acting on the cylinder.

Fig. 6 shows, for the sake of clarity, the development of the distributing edges. These edges may, as in the case of Figs. 1 to 3, extend over angles α of the same order of magnitude as usually employed (say 130°), since, in each of the two working positions, there is a marging of nearly 180° available for adjustment.

Anyway, whatever be the particular embodiment that is chosen, I obtain a system the operation of which results sufficiently clearly from the preceding description for making it unnecessary to enter into further explanations. This system has, over similar systems, many advantages, among which the following may be cited:

It permits of adapting the pumps to engines of different types; and

It necessitates no modification of existing pumps, with the exception of the piston, which is different.

The invention further permits of prolonging the life of the piston. As it is known, the piston wears particularly on that of its surfaces which coacts with the corresponding feed orifice. Therefore, if the wear becomes too great, it is possible, by turning the piston through an angle of 180°, to obtain its operation along zones which are not worn. Accordingly, the present invention applies to the case in which the piston is provided with two sets of distribution edges adapted

to coact separately either with the same orifice or with two distinct orifices so as to produce two ways of working, even when these two ways are similar or even identical.

On the other hand, it should be well understood that, when it is desired to obtain, by means of at least two different sets of distribution edges, different ways of working, these ways of working may differentiate from each other, or from one another, in any manner whatever. In other words, instead of having two sets of inclined surfaces or edges which are inversely disposed with respect to each other (an oblique edge in one set corresponding to a perpendicular edge in the other set), these sets may be of any shape and disposition as necessary. For instance, at least one of them may have two oblique edges, either of the same inclination or of different inclinations and even of opposed inclinations.

It is thus possible, with a single type of piston, to adapt a given pump to two wholly different applications.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention.

PAUL DESCOURTIS.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

P. DECOURTIS
PISTON AND CYLINDER SYSTEMS
Filed April 2, 1942

Serial No.
437,428

Fig.1

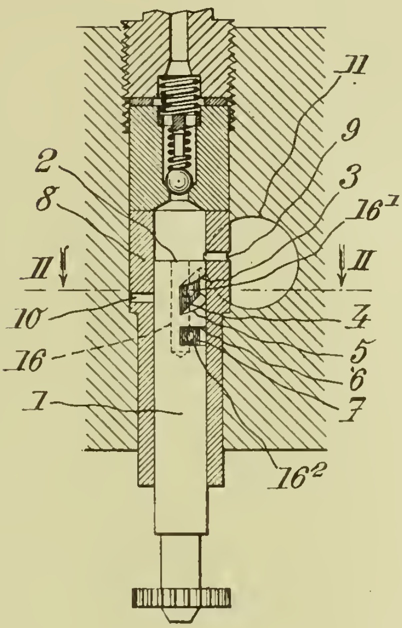


Fig.3

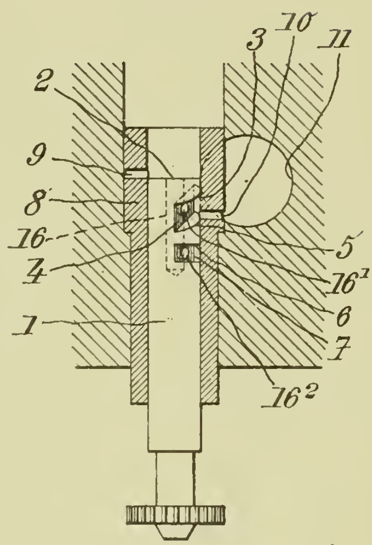


Fig.2

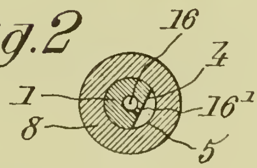


Fig.6

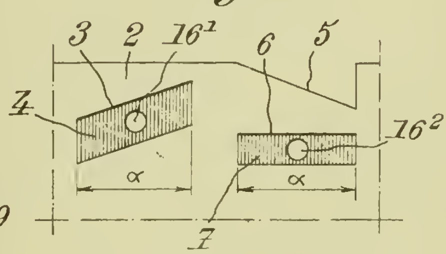


Fig.4

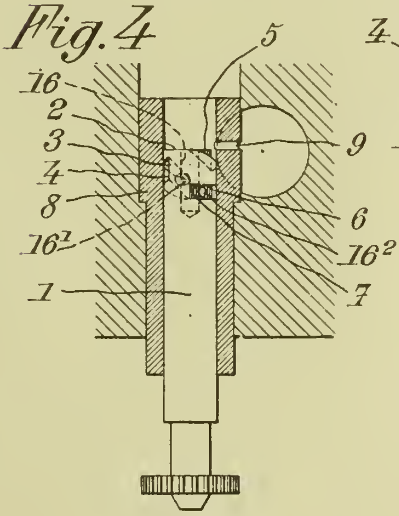
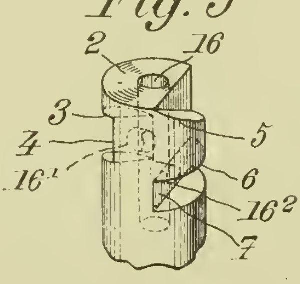


Fig. 5



Inventor

Paul Descourtis,

By Robert B Larson
Attorney

Published May 11, 1943 Serial No. 437,449

ALIEN PROPERTY CUSTODIAN

APPARATUS OF THE KIND OF THE DIVING SUITS

Maxime Jean Richou, Paris, France; vested in the Alien Property Custodian

Application filed April 2, 1942

My invention relates to apparatus of the kind of the diving suit, generally comprising an air and water-tight garment combined with an air-tight helmet, and it concerns more particularly the apparatus of the kind above-referred to which are intended for use in an atmosphere of respiratory gas at a pressure different from normal, such as those for the crew of aircrafts for high altitudes where the air is highly rarefied.

My invention has for its object an apparauts of the kind above-referred to which will permit better visibility, more ease in moving and increased safety in operation of the parts ensuring proper respiration of the user.

A further object of my invention consists in constituting the air-tight garment in the vicinity of at least one of the articulations by a flexible material and by supporting said material by means so arranged that the play of said articulation is less affected by the action of internal pressure than if said means did not exist and preferably that said articulation remains substantially balanced irrespective of the decrease of external pressure.

Another object of my invention is to provide means whereby there may be admitted into the device for ensuring respiration of the user, either air from the outer atmosphere, or air from a compressor or the like, or a gas such as oxygen, said means being controllable through appropriate devices preferably supported by the breast-plate of the apparatus.

Still a further object of my invention is to provide the helmet with a number of windows so disposed, more particularly in front of the user, on both sides and in the upper part, as to ensure the maximum visibility in all directions.

Still a further object of my invention relates to the connecting means between the different parts of the apparatus and more particularly between the helmet and the breast-plate and between the breast-plate and the garment; and it consists in providing said means with quickly dismountable clamping parts. Said means may for instance comprise, in the case of the joint between helmet and breast-plate, a ring or collar so arranged as to exert a wedging action whereby the respective surfaces are pressed against each other.

In the annexed drawings:

Fig. 1 is a side view of an apparatus according to my invention.

Fig. 2 is a front view thereof.

Fig. 3 is a plan view to an enlarged scale of an annular member attached to the breast-plate for connecting same with the helmet.

Fig. 4 shows the corresponding annular member attached to the helmet.

Fig. 5 is an enlarged partial cross-section showing the aforesaid members in contacting relation and pressed against each other by the clamping ring.

Fig. 6 is a partial plan view of the clamping ring.

Fig. 7 is the corresponding cross-section.

Fig. 8 is a front view of the air valve.

Fig. 9 is a cross-section thereof.

Fig. 10 is a front view of the three-way controlling valve.

Fig. 11 is a cross-section thereof.

Fig. 12 is a fragmental front view showing to an enlarged scale a member for connection between the air-tight garment and the breast-plate.

Fig. 13 is a cross-section thereof.

Fig. 14 is a fragmental plan view showing an articulation member.

Fig. 15 is the corresponding cross-section.

Fig. 16 is a diagrammatical axial section of the pressure-limiting valve.

The apparatus illustrated in Figs. 1 and 2 is intended for use on aircrafts flying at high altitudes. It comprises an airtight garment 1, made of rubberized fabric or the like, strong enough to support the difference between internal and external pressure, and enclosing the user's body, as in the case of a diving suit. The said garment covers the legs, body and arms of the user and extends up to the breast-plate.

In order to facilitate the user's motions, the said garment is provided with appropriate articulations so arranged as to be substantially unaffected by the difference between internal and external pressure. Each articulation preferably comprises two rigid annular members 2 and 3 (Figs. 2, 14 and 15) disposed each side of the geometrical axis X—X of the articulation, the fabric being fixed to said members in any appropriate manner, and these two members are connected with each other by means of two rigid or non-rigid connecting rods 4 and 5, made for instance of steel cable, preferably braided with strings. Connecting rods 4 and 5 are substantially disposed in one and the same plane and the latter substantially contains the geometrical axis X—X of the articulation, as shown in Fig. 2 for an elbow, such axis being shown as parallel to the plane of the drawing for the sake of clearness.

Connecting rods 4 and 5 are pivoted to mem-

bers 2 and 3 about axes 6 and 7 substantially parallel to the articulations axis and preferably disposed beyond each corresponding member 2 or 3 with respect to the said articulations axis. It will easily be grasped, for instance, that in Fig. 15 axis 6 is situated below member 3, while the articulation axis X—X lies above same (Fig. 2).

The fabric of garment 1 is firmly attached to members 2 and 3 and the portion of fabric comprised between the latter is long enough to form a sort of bellows 8 affording the necessary degree of freedom for the articulation.

It will be seen in Fig. 2 that the same kind of arrangement is used for the knees. The articulation for the shoulders comprises two annular members 9 and 10 connected with each other by means of connecting rods 11 and 12 which are preferably curved, as shown. The upper member 9 is in turn connected by means of rods 13 and 14 with parts 15 fixed to the fabric. It will be noted that here the pivoting axes 16 of rods 13 and 14 on parts 15 is perpendicular to their pivoting axes 17 on member 9, such arrangement permitting motion of the arm in any direction.

The device corresponding to the wrist is somewhat similar, but the construction is simplified. It comprises a non-rigid ring 18, made of steel-cable, fixed to the fabric, for instance by stitching, and the said ring is connected to a rigid ring 21 by means of steel cables 19 pivoted at 20 on ring 21 and fixed by their other ends to ring 18.

The helmet 24 forming the upper part of the apparatus preferably comprises, as shown, two front windows 25, two side windows 26 and two upper windows 27, such an arrangement affording good visibility in any direction. Each window is formed of two thicknesses of safety glass with an electrical heating device in the intermediate space to prevent frost formation. The electric current may be supplied by the electrical system of the aircraft through an easily detachable plug.

The helmet is tightly fixed to the breast-plate of the apparatus by means of quickly removable connecting and clamping means preferably of the type acting through wedge-shaped portions. In the construction illustrated in Figs. 1 to 5, the connection between helmet and breast-plate comprises two annular members 28 and 29. Member 28 is integral with the lower part of the helmet (which is shown in section in Fig. 4) and it is provided with an annular groove 30 into which fits an annular projection 31 provided on member 29, a rubber ring 22 being interposed for air-tightness. Member 29 is attached to the upper part of the breast-plate. Moreover both members are provided with corresponding recesses or cut-out portions respectively 33 and 34 along their periphery.

Members 28 and 29 are clamped against each other by means of a clamping ring 35 (Figs. 5 to 7) provided with handles 36. Ring 35 preferably comprises a lower inner rib 37 adapted to be axially retained between the lower face of the plain portions 38 (Fig. 5), formed between the successive recesses 34 of member 29 (Fig. 3), and a number of washers 39 (Fig. 5) fixed by screws 40 against bosses 41 projecting downwardly below member 29.

Ring 35 is also formed at its upper part with a number of inwardly projecting portions 42 (Fig. 7) the number and dimensions of which correspond with the recesses or cut-out portions 33 and 34. These projecting portions 42 are formed with their lower face oblique both ways as shown at 43, the thickness decreasing from the middle to the ends. And the plain portions 45 (Fig. 4), formed between the successive recesses or cut-out portions 33 of member 28, have their upper face oblique both ways correspondingly as indicated at 44.

It will easily be grasped that the helmet may be properly placed on the breast-plate provided ring 35 is so disposed that the plain portions 45 of member 28 may pass between the successive projections 42 of ring 35. Then by rotating the latter in any direction the oblique faces 43 of ring 35 engage the oblique faces 44 of member 28 and clamp the latter downwardly against member 29, as shown in Fig. 5. By rotating ring 35 in the reverse direction, the parts become again disengaged.

The breast-plate 32 of the apparatus (Figs. 1 and 2) is also preferably connected with the garment 1 by means of quickly dismountable connecting means. This connection is effected along such a contour that when the breast-plate is detached, the opening in the garment is large enough for the user to have access into the same.

Figs. 1, 2, 12 and 13 show the preferred construction which ensures air-tightness while preserving some flexibility.

The joint comprises along its length a number of plates 85 regularly spaced from each other, these plates being disposed within a hem 86 formed on the upper edge 87 of garment 1. Fig. 2 only shows three of these plates, but it is understood that others are distributed along the whole length of edge 87. Each plate is provided with a threaded rod 88, fixed by welding or soldering, such rod receiving a socket 89 integral with a sector-shaped wing 90 provided with a hole 91. A fly-nut 92 screwed on rod 88 is adapted to press wing 90 against plate 85. Washers 93 and 94 are interposed respectively between plate 85 and socket 89, and between the latter and nut 92. An angle iron 95 extends along the edge of breast-plate 32 and is tightly fixed thereto by rivets 97, the distance between the successive rivets being equal to the distance between the successive holes 91 of wings 90. A continuous packing member 98, made of rubber, is disposed in the angle of iron 95 as shown.

To fix the breast-plate 32 on the garment 1, the edge of the former, with the angle iron 95 and the rubber packing 98, is introduced between plates 85 and wings 90, the heads 99 of rivets 97 being accommodated by holes 91, as shown in Fig. 13. Nuts 92 are then screwed up and the rubber packing 98 is thus firmly pressed against the edge 87 of the garment, which ensures air-tightness. The heads 99 are retained in position within holes 91, which prevents any slipping.

The joint between the breast plate and the garment could also be effected by non-dismountable means, in which case an opening would have to be provided in the garment for the user, such opening being closed by an air-tight closure.

The apparatus described comprises means to feed the inner space, or at least the helmet, with a respiratory gas under substantially constant pressure, the latter being maintained by a manometric device preferably disposed within a heat-insulated housing 46 (Figs. 1 and 2) at the upper part of the helmet. As shown in Fig. 16, this device comprises a set of barometric cells 46*a* submitted to the internal pressure within the helmet and actuating a double-seat valve

46*b*—46*c* which controls air exhaust from chambers 46*d* and 46*e* to the outer atmosphere through conduit 46*f*. An electrical heating element 46*g* is provided to avoid frost formation.

The air feeding means are so arranged as to permit free access of the outer air when the atmospheric pressure is sufficient, or admission of compressed air from an air compressor of the aircraft, or admission of oxygen, more particularly from a bottle carried by the user.

The gas controlling means are preferably supported by the breast-plate, whereby their actuation by the user is particularly easy. A control valve may be provided for each particular admission, or two admissions may be controlled by a multi-way valve, or there may be provided but one controlling distributor.

The construction illustrated comprises a valve controlling access of the outer air and a multi-way valve controlling compressed-air and oxygen admission.

The valve 50 controlling the access of outer air comprises (Figs. 1, 2, 8 and 9) a circular body 51 provided with a threaded periphery, as shown at 52. A cap 53 is screwed on body 51, the said cap being manually actuated by means of a handle 54. Body 51 and cap 53 are provided with sector-shaped openings 55 and 56. When cap 53 is screwed up on body 51, openings 55 and 56 are not in registering relation (position shown in Figs. 8 and 9). By unscrewing cap 53, openings 55 and 56 are brought in more or less complete registration, whereby air from the outer atmosphere may have access to an opening 51 provided through the breast-plate and thence to a conduit 71 (Fig. 1) which opens upwardly in the vicinity of the user's mouth. A packing plate 58 provides air-tightness at the closed position of the valve.

Valve 50 is preferably so arranged as to act as an emergency adjustable exhaust for the case of failure of the automatic exhaust device 46. To attain this purpose, body 51 is formed with a radial hole receiving a ball 59 pressed outwardly by a spring 60. Ball 59 may engage a number of holes or depressions 59*a* formed in a skirt 61 integral with cap 53. The user may thus adjust the degree of opening of the valve to maintain an appropriate pressure within the apparatus without any risk of accidental rotation under the action of vibrations, shocks and the like.

The multi-way valve is provided with means ensuring automatic disconnection of the compressed-air hose (or of any other line between the user and the craft) for a given position of the controlling handle and preferably for the position corresponding to oxygen admission, such an arrangement being of particular advantage when the user has to leave the aircraft by means of his parachute.

The said multi-way valve may comprise a body 65 (Figs. 10 and 11) with four conduits 66, 67, 68 and 69, and a rotatable plug 70 provided with two radial passages at right angle. According to the position of plug 70, conduit 66 is connected with conduit 67, or conduit 68 is connected with conduit 69. Conduit 66 receives a hose admitting compressed air; conduit 67 leads through the breast-plate into the apparatus; conduit 68 is connected with the oxygen bottle (not shown in Fig. 2); and conduit 69 leads to the aforesaid conduit 71.

Plug 70 is actuated by means of a handle 72 integral with a sector 73 provided with an arcuate elongated opening 74 in which there is engaged a roller 75 rotatably carried by a lever 76 (Fig. 11) pivoted at 77. As shown in Fig. 10, there are two pivots 77, lever 76 being in the form of a fork. Lever 76 carries pivots 76*a* (Figs. 10 and 11) for hooks 78 which engage pins 79 projecting radially from the end ring of the compressed-air hose 80.

At the position shown, which corresponds to the connection between conduits 66 and 67 (admission of compressed air into the apparatus) hooks 78 press the end-ring of hose 80 against a packing seat 81 provided within conduit 66. By rotating handle 70 anticlockwise through about 45°, the valve is wholly closed. Opening 74 being substantially circular in the vicinity of its right end (in Fig. 11), roller 75 is not actuated and hooks 78 are not moved. Of course handle 72 may be restored to its former position by rotating same clockwise through about 45°.

When handle 72 is rotated through about 180°, connection is established between the oxygen bottle and conduit 69, which permits oxygen access into the apparatus. Owing to the spiral shape of opening 74, roller 75 is moved towards the centre of the valve. Pivots 76*a* rotate anticlockwise about pivots 77 and therefore move towards the right of Fig. 11, whereby hooks 78 are progressively disengaged from pins 79. Hose 80 may thus be freely disconnected.

A tubular guide 82 fixed to conduit 66 is provided with a double V-shaped groove 83 forming a guide for pins 79 when hose 80 is to be connected with the valve body.

It will be noted that the air ports in the multi-way valve permit a strong air circulation within the apparatus thus ensuring respiration of the user and elimination of carbon dioxide and moisture.

It will be understood that the above description does not limit my invention, the details of which may vary within the ambit of the appending claims.

It may be noted for instance that the condition to be fulfilled to obtain perfect balance of an articulation irrespective of the difference between internal and external pressure, is that the volume comprised for instance within bellows 8 between members 2 and 3 does not vary when the articulation is actuated. If this volume tends to decrease, the internal pressure tends to extend the articulation i. e. to act against the user. But it may be of advantage to devise the parts in such a manner that the said volume tends either to decrease less than if the supporting means did not exist or to increase, in which case the articulation is not stable, the internal pressure acting respectively against or with the user when the latter rotates the articulation.

MAXIME JEAN RICHOU.

PUBLISHED M. J. RICHOU Serial No.

MAY 11, 1943. APPARATUS OF THE KIND OF THE DIVING SUITS 437,449

BY A. P. C. Filed April 2, 1942 3 Sheets-Sheet 1

Fig.1

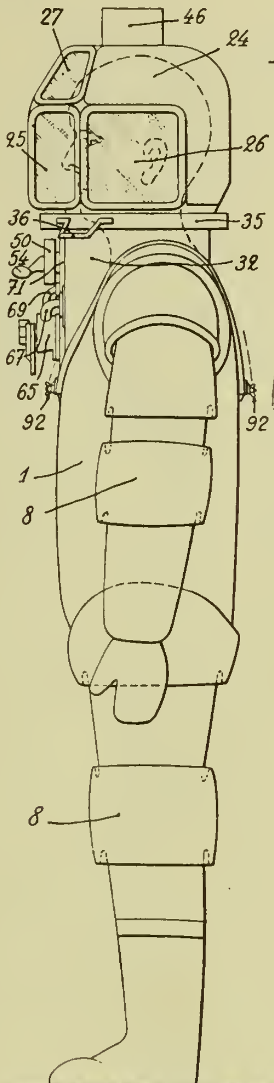


Fig.2

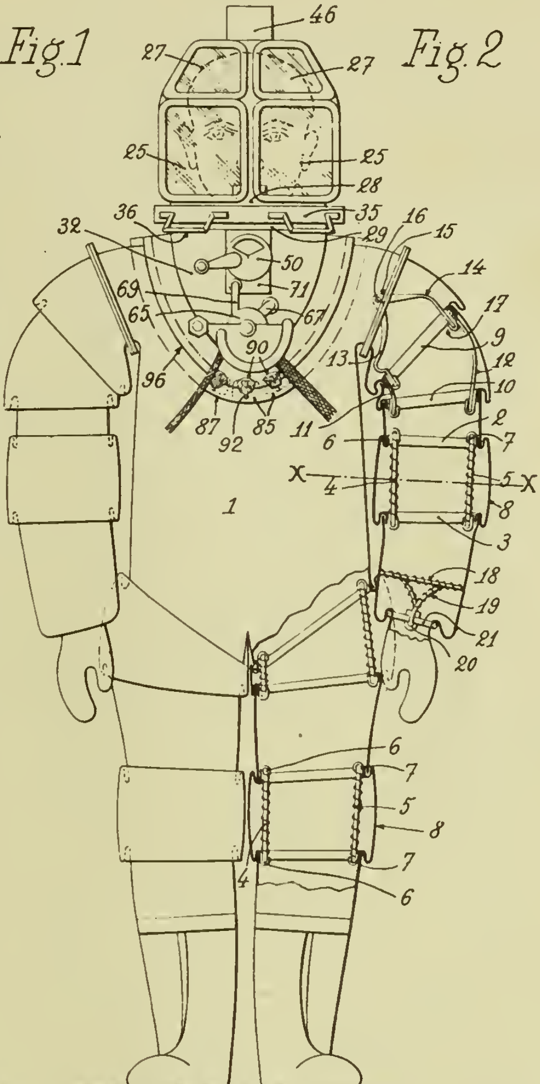


Fig.12

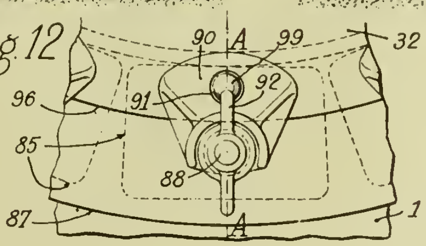
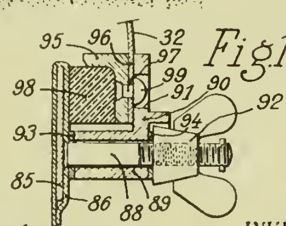


Fig.13



INVENTOR:

Maxime Jean Richou,

ATTORNEY

PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. J. RICHOU

APPARATUS OF THE KIND OF THE DIVING SUITS

Serial No.
437,449

Filed April 2, 1942

3 Sheets-Sheet 2

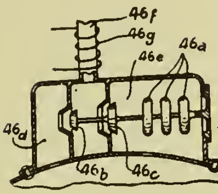


Fig.16

Fig.3

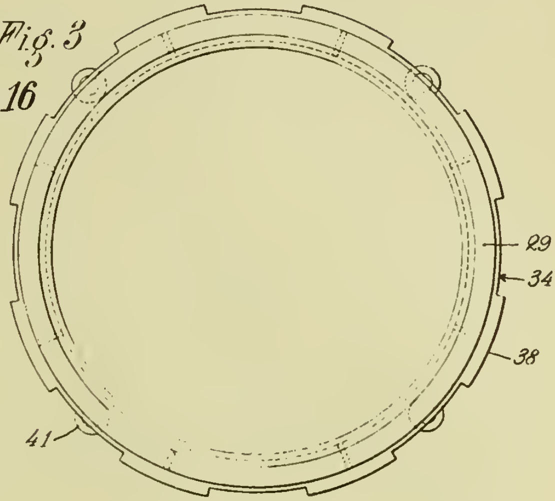


Fig.15

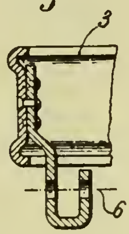


Fig.14

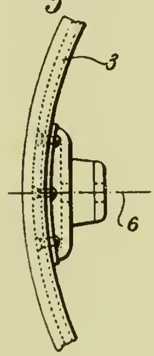


Fig.4.

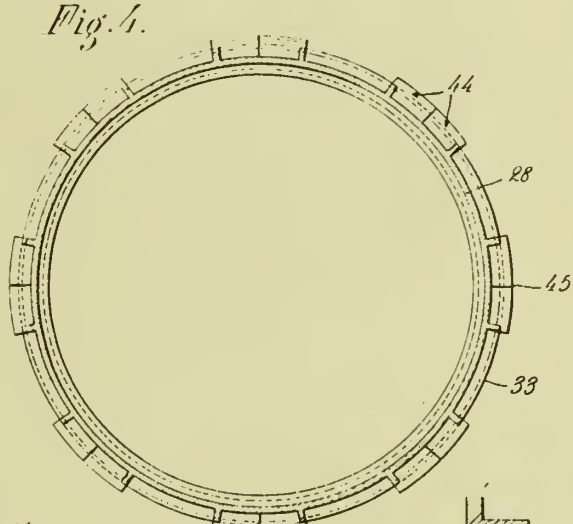
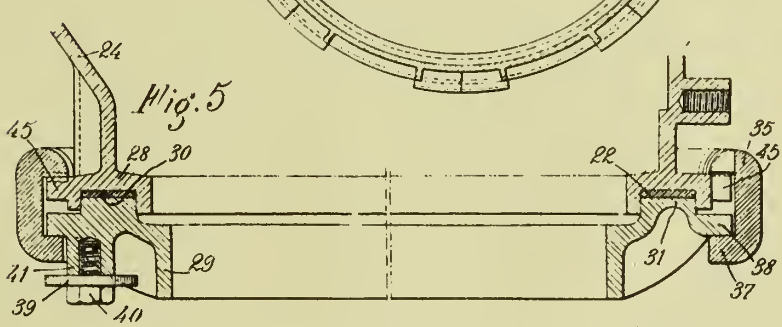


Fig.5



Inventor:
Maxime Jean Richou,

By Robert B Larson
Attorney

PUBLISHED

MAY 11, 1943.

BY A. P. C.

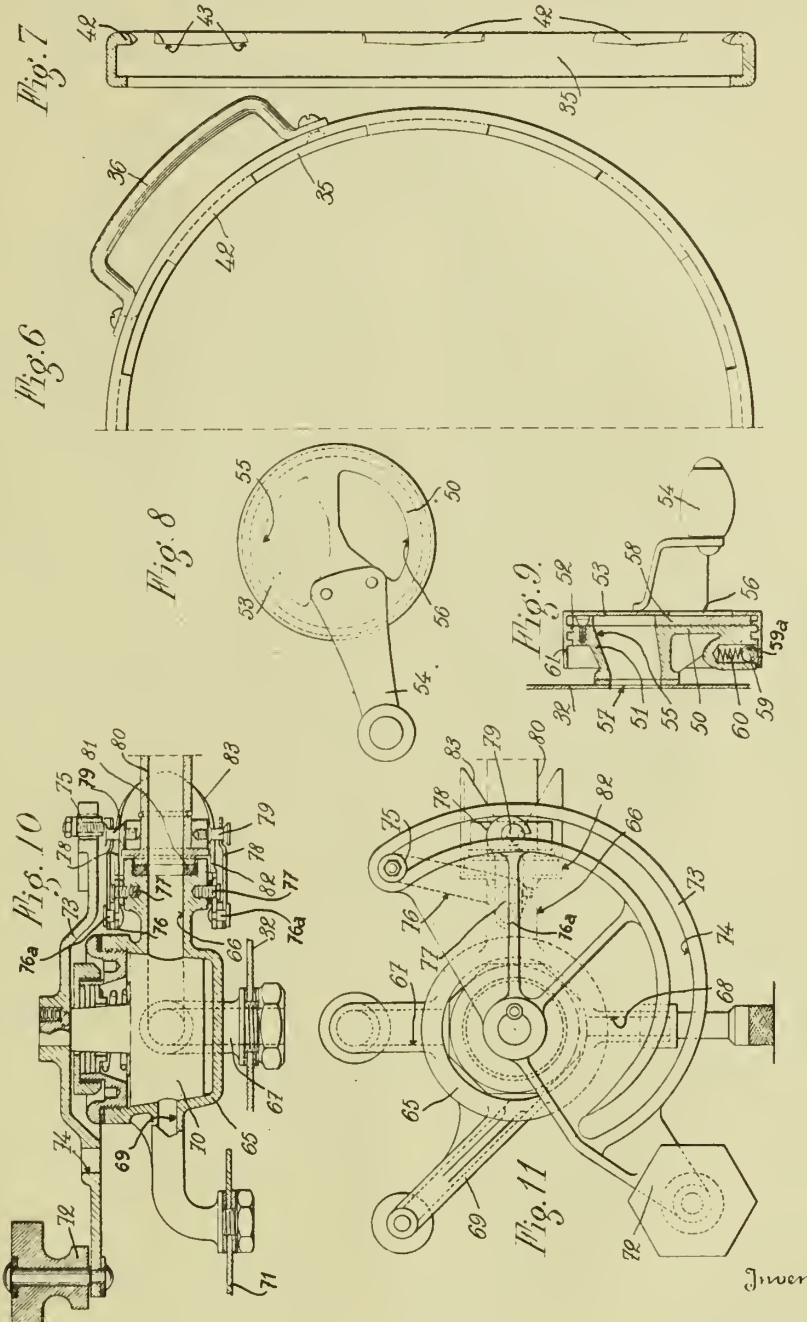
M. J. RICHOU

APPARATUS OF THE KIND OF THE DIVING SUITS

Filed April 2, 1942

Serial No. 437,449

3 Sheets-Sheet 3



Inventor

Maxime Jean Richou,

By Roberts B Larson Attorney

Published May 11, 1943 | Serial No. 439,604

ALIEN PROPERTY CUSTODIAN

METHOD FOR SACCHARIFYING CELLULOSIC MATERIALS BY MEANS OF DILUTED MINERAL ACIDS

Firmin Charles Boinot, Melle, France; vested in the Alien Property Custodian

Application filed April 18, 1942

Processes for saccharifying cellulose by reacting diluted mineral acids at a raised temperature with suitably divided starting material are already known. The necessity of withdrawing as soon as possible the sugar thus produced to subsequent detrimental action of acid and heat has been recognized by some authors.

As a matter of fact, it has been proposed a process wherein restricted amounts of diluted acid solutions (0.1 to 0.4 per cent) are intermittently passed through cellulosic material in a battery of "percolators" under pressure and at increasing temperature, in order periodically to expel from the reaction zone the sugar produced therein, the proportion being of 5 to 10 parts of acid solution for 1 part of cellulosic material to be treated.

While the foregoing process brings about substantial improvement over prior processes as concerns sugar destruction, it is far from solving the problem in a thoroughly satisfactory manner. As a matter of fact, it is well known that one washing of the material in one vessel cannot provide for thorough removal of the sugar contained therein. Hence, the sugar removal by intermittently adding diluted acid, while fresh sugar is produced in the meantime, can be only partial and a considerable proportion of sugar remains in the reaction vessel wherein it is obviously decomposed during subsequent heating in the presence of further amounts of acid.

It is a primary object of this invention to do away with the aforesaid difficulty and thus to obtain higher sugar yields than by practizing prior processes. A characteristic feature of this invention is that between two successive acid hydrolysis treatments, the starting material is subjected to methodical diffusion in a conventional battery, the liquid used as a vehicle being preferably that diluted acid solution which will be employed for the next hydrolysis. The whole amount of sugar produced in each step is thus removed and a starting material thoroughly freed from sugar is forwarded to the next cooking step.

Another feature of this invention is as follows: the successive hydrolysis treatments to which starting material is subjected are performed at increasing temperatures and with decreasing acidities.

A still further feature of this invention comprises subjecting to hydrolysis a cellulosic material containing only that amount of acid which has been absorbed by its pores, i. e. without any covering or coating liquid. It is thus possible to obtain less diluted sugar solutions than according to other known processes.

Broadly speaking, four successive hydrolysis with intervening methodical diffusion as above set forth will be sufficient for exhausting the starting material but it is obviously within the ambit of this invention to subject cellulosic material to a larger number of hydrolysis.

The concentration of acid liquor and the cooking temperature in each one of the successive treatments may vary within fairly broad limits according to the nature of wood under consideration. By way of merely indicative example, acidities of 6 to 2 grams or 10 to 3 grams per litre may be employed according as hydrochloric acid or sulphuric acid is resorted to; as to temperature, it may vary from 150 to 200° C.

It has been found advantageous to deacidify the material remaining after the last hydrolysis and consisting of entirely exhausted lignin by methodically washing it with hot or cold water. Deacidification is favourable in the respect of further use of lignin, particularly for the manufacture therefrom of a high grade charcoal adapted to be employed in automobile vehicle gas producers.

According to the species of wood, the alcohol yield varies from 220 to 280 litres per 1,000 kg of dry wood. The acid consumption ranges from about 8.5 kg to about 16.5 kg per 100 litres of alcohol according as the case may be.

In spite of the use of diffusion batteries between successive hydrolysis, the apparatus is relatively simple and inexpensive as a large number of its component parts particularly the diffusion elements can be made of wood.

The following example which is not limitative will show with reference to the accompanying drawing, the manner in which this invention may be carried out into practice.

The apparatus shown on the drawing comprises four units 1, 2, 3, 4 each of which includes an acidulated water tank A, a cooking vessel C and a diffusion battery D. The first unit further comprises a humidifying tank B in which acid solution impregnates the starting material.

Wood comminuted into chips is fed through pipe 1 to tank B wherein it is acted upon by said acid solution at a temperature of 90° C. from tank A_1, the solution being an aqueous solution containing 5 grams of hydrochloric acid per litre. After being contacted for 30 minutes the wood mass has absorbed 2.5 times its weight of acid solution. After drainage, it is dumped into the cooking vessel C_1 having a capacity of 100 hecto-

litres wherein it is cooked during 45 minutes under a steam pressure of 5 kilos per sq. cm., corresponding to a temperature of about 165° C.

The material is then forwarded to diffusion battery D_1 which includes 6 diffusors having a capacity of 100 hectolitres, wherein it is countercurrently contacted in usual manner with an aqueous solution containing 4 grams of acid per litre which is supplied from tank A_2 at a temperature of 90° C through pipe **2**.

A solution having a large content of pentoses and further including a little hexoses flows through pipe **3** and is gathered in collector S. Excess washing liquid flowing out of each diffusion element is recovered in pipe **4** and returned to tank A_2.

As to starting material thoroughly freed from sugar and impregnated with acid liquor having an acid content of 4 grams per litre, it is elevated after draining by raising means **5** of any kind to the cooking vessel C_2 of the second unit wherein it is subjected for 15 minutes to a cooking treatment under steam pressure of 8 kg per square centimeter corresponding to a temperature of about 175° C.

From cooking vessel C_2, the material is dumped into diffusion battery D_2 wherein it is washed with water having an acid content of 3 grams per litre coming from tank A_3. A solution containing an amount of sugar corresponding to thorough exhaustion of the starting material is withdrawn from the discharge part of the battery.

A like process takes place in cooking vessel C_3 and in battery D_3, the acid solution used in the latter having an acid content of 2.5 grams per litre and the pressure in cooking vessel C_3 being 12 kg per square centimeter corresponding to a temperature of 185° C. Cooking is performed during 15 minutes. Again the withdrawal of sugar liquid from D_3 is so controlled as to secure thorough exhaustion of the material.

In the last cooking vessel C_4 the steam pressure is about 20 atmospheres corresponding to a temperature of 195° C and the duration of the cooking process can be as short as 7 minutes. The washing liquid used in diffusion battery D_4 is water preferably heated to 90° C. From the discharge end of battery D_4, there is obtained on the one hand a sugar solution which is removed in the same way as the preceding ones, for instance through collector S, on the other hand pure water which is discarded through pipe **6** and finally exhausted deacidified lignin which may be employed for any purpose, particularly for manufacture of charcoal for gas producers (conduit **7**).

The above described plant can be modified in various respects without departing from the spirit of this invention. Particularly it may be advantageous to provide cooking vessels of decreasing sizes from the first one to the last one in order to make allowance for the volume reduction suffered by the starting material as the treatment proceeds. The following sizes may be adopted as an example:

First unit:	C_1 100 hectolitres
	D_1 6 diffusors of 100 hectolitres
Second unit:	C_2 80 hectolitres
	D_2 6 diffusors of 80 hectolitres
Third unit:	C_3 62 hectolitres
	D_3 6 diffusors of 62 hectolitres
Fourth unit:	C_4 50 hectolitres
	D_4 6 diffusors of 50 hectolitres.

Again the sugar solutions obtained from each diffusion step can be mixed together or separately recovered.

Still again only the liquid from the first diffusion step may be gathered separately from the remainder of sugar solutions, as it has a high pentose content and the pentoses may be converted into valuable products such as furfurol.

Nor will the spirit of this invention be departed from if diffusions are effected by means of pure water, the moist mass thus obtained being then admixed for the next hydrolysis with such a mass of acid that suitable acidity will be secured without the volume of liquid retained by the material being increased.

The method according to this invention is valuable for treating not only wood chips or sawdust but also all cellulosic materials of any type whatever.

The sugar solutions manufactured in accordance with this invention may be treated for recovering the sugars contained therein or subjected to any fermentation for converting them into valuable products for instance alcohol. In the latter case it is advisable to employ the yeast reuse method described and claimed in U. S. Patent 2,054,736.

FIRMIN CHARLES BOINOT.

PUBLISHED

MAY 11, 1943.

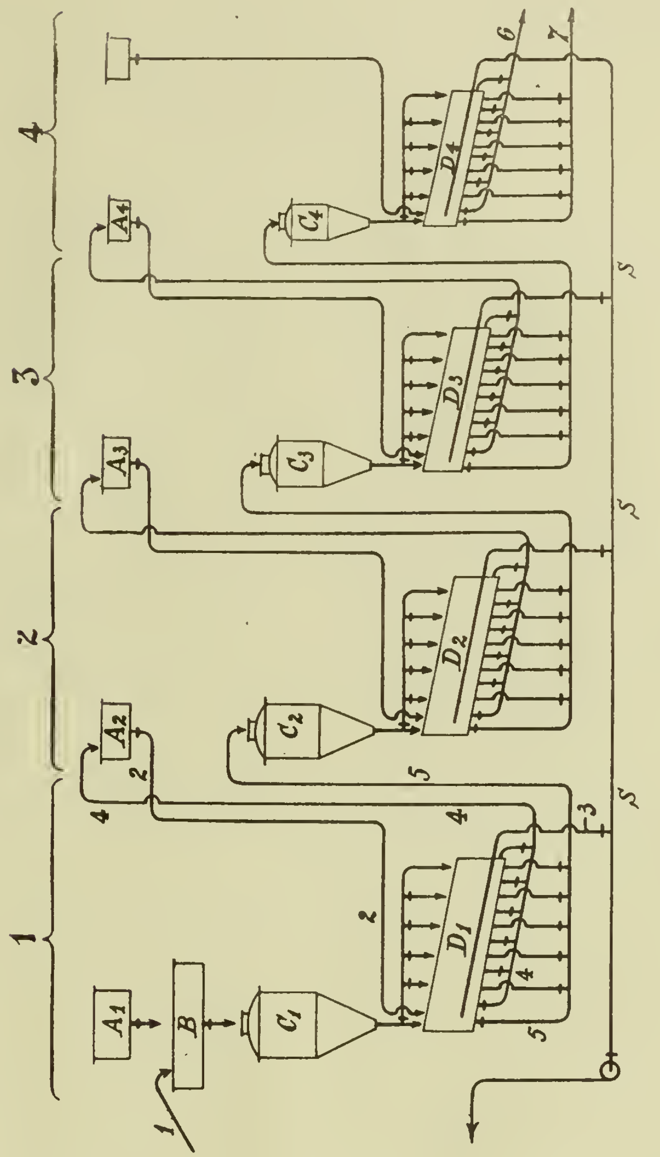
BY A. P. C.

F. C. BOINOT

METHOD FOR SACCHARIFYING CELLULOSIC MATERIALS
BY MEANS OF DILUTED MINERAL ACIDS

Filed April 18, 1942

Serial No.
439,604



Inventor:
F.C. Boinot
By: Richard K. Stevens
Atty.

Published May 11, 1943

Serial No. 441,860

ALIEN PROPERTY CUSTODIAN

AIR TUBES FOR PNEUMATIC TYRES

Alfred Louis Couturier, Orleans, France; vested in the Alien Property Custodian

Application filed May 5, 1942

My invention relates to air tubes for pneumatic tyres applicable to vehicles of any kind.

A primary object is to provide an air tube constructed to minimize deflation in case of puncture. According to my invention, the air tube is divided in a number of cells by air-tight flexible inner partitions; through the latter passes an air supply tube having an inflating valve, said tube being adapted to deliver air to the cells through apertures in its periphery. The air supply tube may be provided with a membran arranged to be applied against its inner wall after inflation of the cells, and to close the apertures, so as to prevent any back flow of air through the inflating valve.

The following description with reference to the appended drawings given by way of non-limitative examples will show the manner in which my invention may be carried out into practice.

Fig. 1 is a transverse section through a pneumatic tyre having an air tube in accordance with this invention, the section being taken along line I—I of Fig. 2.

Fig. 2 is a corresponding longitudinal section of a portion of the tyre, the section being taken along line II—II of Fig. 1.

Fig. 3 is a perspective view, partly broken away, showing a partition.

Figs. 4 and 5 are transverse sections of the air supply tube through the inflating valve, during inflation and at the end of inflation respectively.

Fig. 6 is a partial cross-section analogous to Figs. 4 and 5, showing the parts adjacent to an air supply aperture.

Fig. 7 shows a modified form of the embodiment illustrated by Fig. 1.

Figs. 8 and 9 are respectively a longitudinal section and a cross section of a modified air tube.

Referring to Figs. 1 to 6, the air tube **1** positioned in cover **2** is divided into compartments or cells **13** by transverse partitions **3** made of rubber or like flexible material; any suitable number of cells may be provided, for instance 80 in a conventional automobile air tube. Each partition **3** (Figs. 2 and 3) has a larger diameter than air tube **1** in order to have a substantial amount of play. The marginal portion of each partition is bent at **3***a* and is cemented and vulcanised to the inner surface of the air tube. As better shown on Fig. 2 and 3 the bent portion or flange **3***a* has a gradually increasing width from the bead side to the crown side of the tube, its outer end lying substantially in a radial plane with respect to the wheel.

In the vicinity of the bead contacting or lower portion of the air tube, each partition **3** has an aperture **4** with a wide collar **4***a* to accommodate an endless tube **5** on which the collars **4***a* are cemented and vulcanised to ensure air-tightness.

The tube **5** is made of rubber with a strong canvas layer positioned around it, as shown at **5***a*, or alternatively embedded therein, so as to remain sufficiently rigid and avoid any distorsion; the tube **5** has apertures **6** with reinforced edges each of which opens in a cell **13** for air supply thereto. The tube **5** is divided into two annular chambers A, B by an endless band or membran which is cemented along its edges at **7***a* (Figs. 1 and 4) and is wide enough to move in the tube and close the apertures therein as will be hereinafter explained.

The inflating valve for supplying air to the cells extends as far as and opens through said band or membran **7**; the valve comprises two concentrical cylindrical parts **8**, **9**; part **9** is screwed into part **8** so that they may be moved lengthwise with respect to one another. The outer part **8** is secured to air tube **1** (Figs. 4 and 5) by means of a sleeve **19** provided with inner and outer screw-threads, which is screwed over part **8**, the upper end of sleeve **19** has a flange **19***a* and the air tube **1** is nipped in known manner between flange **19***a* and a washer **20** by a tightening nut **21** screwed on the body portion of sleeve **19**. The outer part **8** of the valve extends into tube **5** to which it is secured in the same way as described with reference to air tube **1**; as to inner part **9**, it is secured through its upper end to the band or membran **7** in the following manner:

The upper end of part **9** has a flange **9***b* which may freely turn in a groove in a big washer **22**; the latter merges downwardly into a sleeve **22***a* having an outer screw-thread to receive a splined washer **23** and a nut **24**. The band or membran **7** is nipped by nut **24** between washers **22** and **23**. Hence the inner part **9** of the valve may rotate to be screwed into outer part **8** or unscrewed for relative lengthwise movement. Said inner part at its base is rigid with a nut or knurled thumbpiece **10** which enables of rotating it. Parts **8** and **9** have ports **8***a*, **9***a* which are offset or staggered in vertical direction so that they may be brought to register by suitably moving part **9** in part **8**. The outer end **11** of part **9** is arranged to accommodate the inflating pump connector and the air check valve **12** is housed therein. A resilient pad **14** is positioned on the inner surface of tube **5** opposite the end **9***c* of part **9**.

The operation is as follows (Figs. 1, 2 and 4): when air supplied to the valve from an inflating pump, it travels along a path indicated by arrow f_1, enters the upper annular chamber A in tube 5 and is distributed past apertures 6 into the various cells 13 in the air tube. As soon as the air pressure within the air tube is deemed suitable, the knurled thumb-piece or nut 10 is operated to move up part 9 in part 8. At the end of its stroke, part 9 has its end 9*c* in abutting contact with pad 14, thereby preventing any back flow of air towards check valve 12; ports 8*a* and 9*a* are in registering relationship as shown on Fig. 5. As inflating is resumed, air from the pump is forwarded through ports 8*a*, 9*a* into lower annular chamber B in tube 5; inflation is continued until the pressure prevailing in chamber B is substantially higher than within the cells, in order that membran 7 is securely applied against the inner wall of tube 5 and thus closes apertures 6 (Fig. 6). From now on, the inflating connector may be removed and the valve nose may be fitted with its cap, any back flow of air from the cells being prevented.

Assuming that any one of the cells happens to be punctured, the pressure in the other cells will elastically deform the partitions of the emptied cells, the average inner pressure of the air tube will be lowered by a negligible amount and the tyre will generally behave as though no deflation took place.

The operation for deflating the air tube is as follows: chamber B is set in communication with atmosphere, ports 8*a* and 9*a* being in registering relationship, then nut 10 is operated to move down valve part 9, when chamber A and thus all cells are in communication with atmosphere through the valve inner hole.

Instead of being housed within the air tube, the feed tube 5 may be partly located without air tube 1, as shown on Fig. 7; in such instance, the supply tube is partly encased in a well base rim 15. The latter arrangement which results in a lighter weight is particularly valuable for bicycles and motocycles.

According to a further modification, each aperture 6 corresponding to a cell is provided with a check valve adapted to close it for preventing agress of air from the cell when inflation is being performed. The check valve arrangement plays the part previously attributed to membran 7. A check valve of this character may be constructed as shown on Figs. 8 and 9, i. e. comprises a flat disk 17 biassed by a spring 16 away from its seat. A resilient ring or belt 18 secured to supply tube 5 limits the movement of check valve 17 away from its seat. The partition 7 which divides tube 5 into chambers A and B and that portion of tube 5 which lies above partition 7 are suitably provided with canvas as diagrammatically indicated at 7*b*, 5*b* on Figs. 8 and 9, so as to be substantially rigid and, as already explained, the valve is attached to said partition for supplying air either to chamber A or to chamber B.

Air forwarded to chamber A enters the cells through apertures 6; as the pressure in the cells is the same as in said chamber, check valves 17 are held away from their seats by springs 16. When the pressure is deemed suitable, the valve is operated as hereinbefore set forth to supply inflating air to chamber B and a pressure slightly above the pressure prevailing in chamber A is built up in said chamber B. As chamber B becomes expanded, belts 18 are caused to press check valves 17 onto their seats against action of springs 16; apertures 6 are thus closed thereby providing for maintenance of pressure in the air tube.

For deflating the latter, it is only necessary to unscrew the valve, assuming said valve in communication with chamber B, to cause escape of air from said chamber; as the belts 18 are no longer stressed, they release check valves 17 which are then biassed by springs 16 away from their seats, thereby placing the cells in communication with chamber A. By properly operating the valve, chamber A is in turn placed in communication with atmosphere and becomes deflated.

It will be apparent that the foregoing embodiments of my invention may be altered without departing from the spirit of said invention as comprehended with the appended claims; for instance, I may divide the cells into two or three compartments which would amount to supplementary cells.

ALFRED LOUIS COUTURIER.

PUBLISHED

MAY 11, 1943.

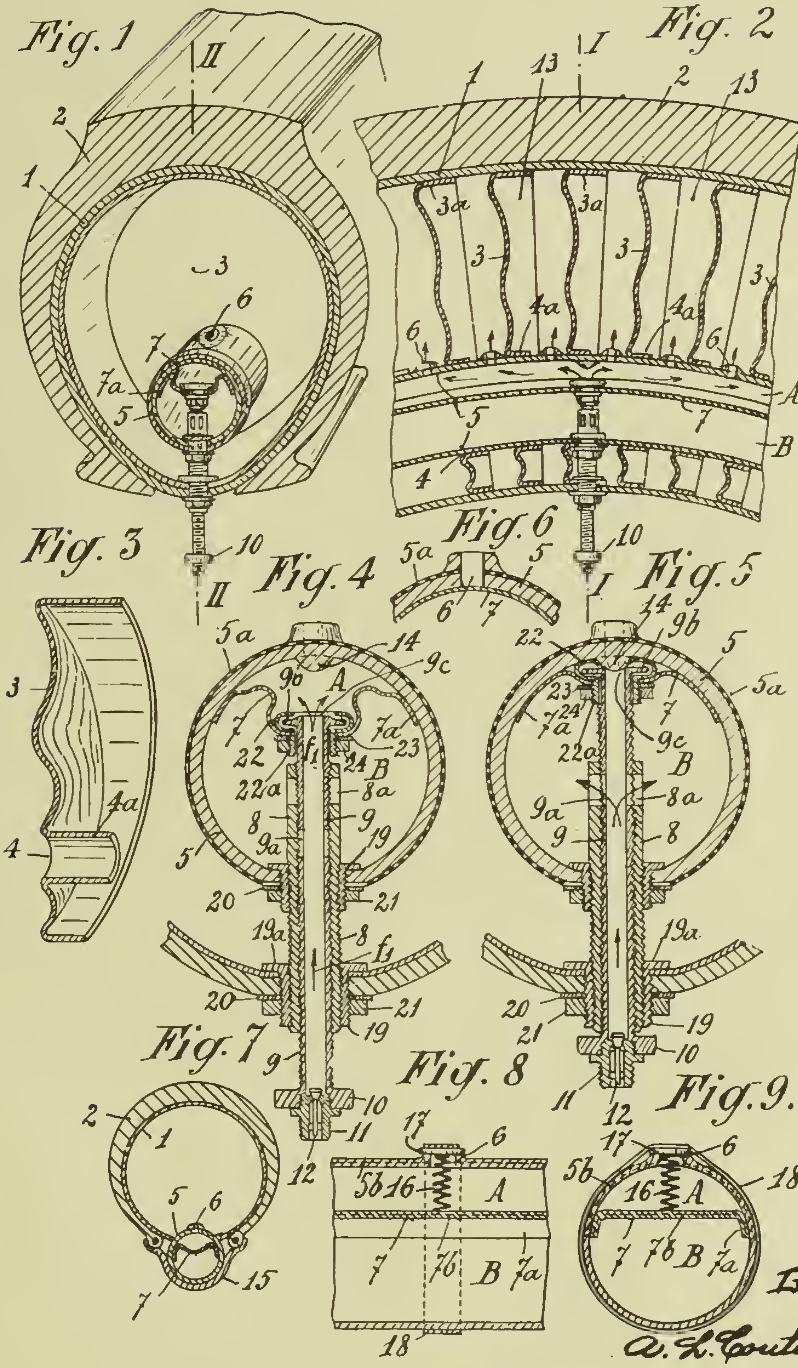
BY A. P. C.

A. L. COUTURIER

AIR TUBES FOR PNEUMATIC TYRES

Filed May 5, 1942

Serial No.
441,860



Inventor

A. L. Couturier

By Watson, Cole, Grindle & Watson

Attorneys.

Published May 11, 1943

Serial No. 442,130

ALIEN PROPERTY CUSTODIAN

HEARTH FOR BURNING SOLID FUELS LEAVING ASHES HAVING ANY MELTING POINT

Alexandre Adrianoff, Ixelles-Brussels, Belgium; vested in the Alien Property Custodian

Application filed May 7, 1942

The hearths designed and carried out hitherto in practice can not rationally use indifferently fuels leaving slags or other fuels leaving ashes as a residue.

The hearths designed for residues assuming the form of compact slags can not tolerate even a partial formation of ashes; on the other hand hearths planned for residues assuming the form of ashes stop working correctly as soon as said residues appear under the form of slags.

The hearths with movable grates allowing to a certain extent to separate the ashes from the slags have the disadvantage, especially in the case of small-size fuel, that they allow the passage into the ash-pit of a substantial proportion of unburnt fuel.

The hearths of the compound type, in which the slags or the ashes are transferred from a main hearth in an auxiliary hearth operated parallely with the first have the drawback that they produce waste gas the composition of which varies greatly according to the proportion of combustible matter which happens to be in the auxiliary hearth.

As to the hearths with mechanical slagging, they need not only a mechanism often quite delicate and always expensive, but they require accurate regulating, which depend from the quality of the fuel and which they must be altered each time the quality of fuel changes, for want of which they discharge a large proportion of unburnt fuel together with the residues or allow on the contrary the residues to accumulate in the hearth.

The object of this invention is to provide a hearth intended for use of solid fuels leaving ashes having any melting point, which allows use in the same hearth of fuels of different grades leaving as combustion residues hard slags as well as ashes without any change of the regulating of the apparatus or any intervention of mechanical numbers, while allowing at the same time to do completely away with the losses due to unburnt fuel in the residues.

The accompanying drawing shows on Figures 1 and 2 vertical sections of an embodiment of the invention and Figure 3 shows also a vertical section of a modification of the relationship of the various parts, the principle remaining the same.

Figure 1 shows for example a main hearth **1**, fed with fuel, by hand, mechanically or by gravity and provided with walls **2**, supporting the fuel, which walls have a slant sufficient to prevent the fuel and the ashes from adhering to them. Said Figure 1 shows also a secondary hearth **4**, in which the fuel atfer having passed through hearth **1** slides to achieve its combustion and which is connected with said hearth **1** by means of an opening wide enough to allow the free passage of the ashes, the small-size slag and the fuel, the opening being located in such relationship to said main hearth and to said auxiliary hearth, that no portion of the mass burning in said main hearth is prevented from having access to said auxiliary hearth.

The primary air is conveyed to the main hearth through a grate **5** or a nozzle **6**, or simultaneously through both these members or else by any other device. The primary air is conveyed to the secondary hearth through the ash-pit **7** and the grate **9** or the opening **8** or by means of any other device. It is well understood that for both hearths the air may be sucked-in by natural or induced draft or blown-in under pressure.

When air under pressure is used it is of course distributed so that the air entering the principal hearth may never be driven back into the auxiliary hearth, i. e. so that the gases coming from said auxiliary hearth can always be discharged through the principal hearth.

Doors, such as **10** and **11** shown in dotted lines on Figures 1 and 2 are provided for access to hearths **1** and **4** respectively.

Furthermore, as in most hearths, the hearth according to the invention may be provided with secondary air entrances (not shown on the drawing) located in accordance with the usual practice.

The hearth above described works as follows.

When hearth **4** works with a slow-pace combustion, the fuel which it contains or the replacement fuel coming from hearth **1** leaves always as a residue ashes or slag fragments of very small size. When the main hearth **1** works at a quick-pace, it produces according to the character of the fuels, hard slags, brittle slags together with more or less ashes and in some very rare cases only ashes.

When slags are formed in the main hearth they can not run down into the auxiliary hearth for, as they are in a melted form only adjacent to grate **5** or nozzle **6**, they are kept back by the fuel or the ashes contained in the secondary hearth.

On the contrary, the ashes or small size slags coming from the main hearth slide into the secondary hearth until the latter contains only residues.

The hard or brittle slags formed in the main hearth set down upon grate **5**, on the wall or walls of nozzle **6** and eventually upon the wall above the opening **8**. They form then a more less resisting bridge showed as a checkered section on Figure 2.

Slagging of the apparatus is generally effected in two moves as follows:

1. The lower door **11** is opened and the ashes and small slags, which form the contents of the auxiliary hearth **4** and those, which may have fallen into the ash-pit **7** are removed, whereupon door **11** is closed again.

2. The slags are removed from the main hearth **1** by means of a poker through door **10**. By this removal the ashes, the small slags and some of the glowing fuel which lies on top of the slags drop automatically in the auxiliary hearth. The main hearth is thus entirely cleaned. The auxiliary hearth is provided for a capacity always great enough to store up besides the residues a certain amount of burning fuel. The fuel goes on burning when it has arrived in the auxiliary hearth and the ashes it produces will be removed cold, as well as the ashes from the first slagging of the main hearth, in course of the following emptying of the auxiliary hearth.

As both hearth **1** and **4** are placed in series, there is no need of paying attention, as would be the case if both hearths should work parallely, to the percentage of combustile matter in the auxiliary hearth, which percentage moreover varies continually as the combustion proceeds to its end in said hearth. In fact the process faced is the following: as long as there is combustible matter in the auxiliary hearth, the combustion gases coming from this hearth slow down the main hearth. As the amount of combustible matter becomes less in the auxiliary hearth, the gases coming from the latter contain more and more air in excess, which speeds up the main hearth.

The total amount of thermal units produced in a given time by both hearths remains thus substantially the same, whatever the percentage of combustible matter in the auxiliary hearth may be. Likewise said percentage has no noteworthy influence upon the composition of the combustion gases discharged by both hearths together.

Figure 3 shows a modification based on the same principle.

Referring to this figure, **12** is the main hearth and **13** the auxiliary hearth. The primary air is admitted to the main hearth through the grate or movable nozzle **14**, which is adapted to rotate about an axis **15** to assume the position shown in **14'**. Said grate or nozzle **14** leaves between its free end and the wall **16** and grate **17** an opening **18**. The primary air is introduced into the auxiliary hearth through ash-pit **19** and grate **17**. Doors **21** and **20** give access to hearth **13** and ash-pit **19** respectively.

When hearth **12** is slagged up, one proceeds to remove the ashes which lie in **23** and to rotate then the grate or nozzle **14** to the position shown in **14'**. The slag **22** is removed by means of a poker. The glowing fuel contained in hearth **12** and the ashes which may be found above the slag fall upon grate **17** where they form a heap **24**. Grate **14** is then restored to its position and some glowing fuel is pushed back into the opening **18**. Grate **14** is then fed again. The combustion gases coming from hearth **13** pass through grate **14** and opening **18** into hearth **12**.

By the next slagging hearth **13** is first emptied whereupon the same course as hereinabove described is followed.

In comparison with the known art the new device possesses the following advantageous features:

1. The possibility of burning in the same hearth, without any change of regulating, different kinds of fuel without regard to the melting point of the ashes.

2. The possibility of burning fuels the ashes of which melt at very low temperatures without impairing in the least the speed of combustion, because the temperature within the burning layer of fuel in hearth **1** is substantially lowered thereby that the combustion gases of hearth **4** and more particularly the carbon dioxyde pass through said layer.

3. The possibility of burning fuels of very different sizes, although the variation of the size entails the variation of the character of the combustion residues.

4. The possibility of operating the hearth at any pace, from the quickest to the slowest without fear about the variation of the character of the residues, which is the unavoidable result of a change of pace. Hence, the possibility of limiting the number of hearth sizes, as each size can cover a wide range of power.

5. The possibility after regulating once for all the hearths, of maintaining an optimum composition of the burnt gases during the whole duration of the operation between two slaggings.

6. The absence of any mechanical part and hence low cost price and full security of operation.

ALEXANDRE ADRIANOFF.

PUBLISHED

MAY 11, 1943.

BY A. P. C.

A. ADRIANOFF

HEARTH FOR BURNING SOLID FUELS LEAVING ASHES HAVING ANY MELTING POINT

Filed May 7, 1942

Serial No

442,130

Fig. 1

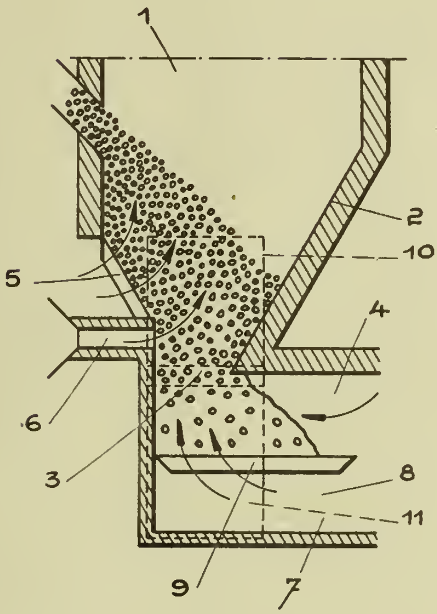


Fig. 2

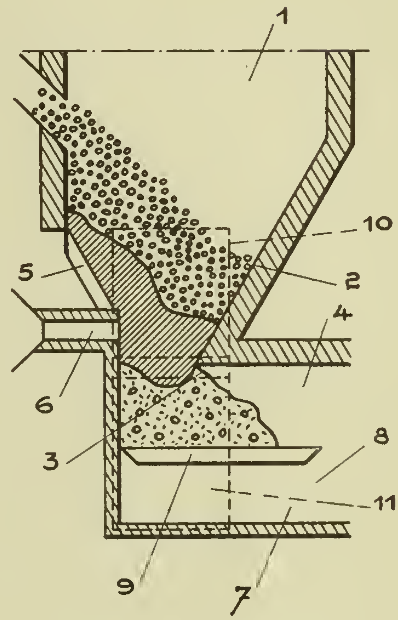
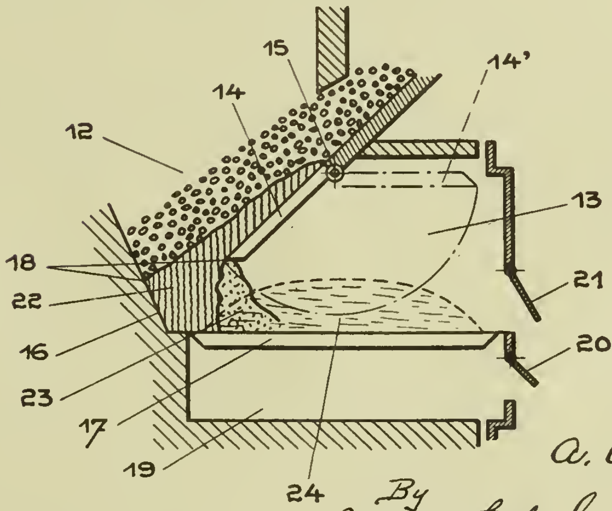


Fig. 3



Inventor
A. Adrianoff
By
Watson, Cole, Grindle & Watson
Attorneys.

Published May 11, 1943 Serial No. 445,792

ALIEN PROPERTY CUSTODIAN

METHOD AND DEVICE FOR MANUFACTURING SPRING-NETS FOR MATTRESSES, SEAT-CUSHIONS AND THE LIKE

Hugo Büttner, Wuppertal-Vohwinkel, Germany; vested in the Alien Property Custodian

Application filed June 4, 1942

Spring-nets for mattresses, seat-cushions and the like have hitherto been manufactured in that the individual springs have been wound into one another by hand. This manual work is of course comparatively expensive.

The object of the present invention is to carry out said winding operation mechanically, whereby the manufacture of spring-nets of the kind stated, especially double springs, can be carried out speedier and in a simpler manner.

According to invention the method adapted is that the spring to be interwound with an adjacent spring is wound up a mandrel having a smaller diameter than the mentioned spring, over which the adjacent spring in its untensioned state is placed.

The device according to invention for carrying out this method comprises upwardly and downwardly controlled winding mandrels protruding through a cover plate. Their upper ends having recesses adapted to take the ends of the springs.

In order to provide the springs during winding with elongated loops extending in the direction of the spring said recess is formed on the one hand by a bolt arranged at the rim of the frontal face of the mandrel, and on the other hand by an oblique jaw likewise arranged on the rim of said frontal face.

The unwound piece of spring wire must be kept tensioned during the winding operation. This is effected according to the present invention with the aid of stops provided laterally in front of the winding mandrels against which the unwound piece of spring wire bears.

In order to render possible the manufacture of a double spring there are according to this invention two winding mandrels provided and situated remote from another by a distance corresponding to the diameter of a finished spring, and in front of said mandrels a bending device is provided so dimensioned as to suffice for two springs located side by side and so designed as to be able to give a wire piece cut from a roll of hair pin bend of 180° in its center.

This bending device consists, according to invention, of a disk detachable from the cover plate and having a diameter corresponding to the space between the winding mandrels and having upon its axle a gripper arm to take hold of the spring wire.

In order to prevent the stop pertaining to the second winding mandrel from constituting an obstacle during the winding procedure it is designed, according to this invention, in such a manner that it can recede when the winding process is completed.

When manufacturing a single spring the end thereof must be provided with a loop, therefore, according to invention, the one knife jaw of the cutting device can be concentrically moved about the forming bolt for the spring loop, thus bending of the loop and cutting-off takes place simultaneously.

The object of invention is shown schematically in the drawings, and show as follows:

Figs. 1–6 the method for the manufacture of a spring-net consisting of double springs,

Figs. 7–14 the method for the manufacture of single springs,

Fig. 15 is a plan view of the device,

Fig. 16 a side view of Fig. 15,

Fig. 17 a diagrammatical representation of the winding procedure,

Fig. 18 a plan view of the parts serving to bend the loop at the end of a single spring,

Fig. 19 a finished double spring,

Fig. 20 a finished single spring,

In Figs. 1–3 and 7–10 is illustrated the manufacture of the first row of the spring-net, and Figs. 4–6 and 11–14 show the interwinding of the second row of the net with the first row.

When manufacturing a spring-net of double springs two mandrels x and y (Figs. 1–6) are used, and when making a spring-net of single springs (Figs. 7–14) only one mandrel is employed. These mandrels revolve about their longitudinal axis in a clockwise and in an anticlockwise direction, and are supported in a machine frame in which they can move upward and downwardly.

In the following the method of manufacturing a spring net according to Figs. 1–6 is described. The mandrels x and y are firstly in their lowermost position, then each receives one end of the wire which has been bent to resemble a hair pin and finally constitutes the double spring 1 and 2. The mandrels then grip the ends and revolve in an anticlockwise direction, moving upwardly simultaneously. Coinciding with the mandrels gripping the wire ends the loops a and b are bent and formed. By reason of the rotation and upward motion of the mandrels the wire is helically wound upon them. Thereafter the mandrels move downwardly and the loops a and b become disengaged from the gripping device whereby the springs 1 and 2 are untensioned so that they assume relatively to the mandrels a and b the position of springs 1 and 2 shown in

Fig. 1. That is encompassing the mandrels in an untensioned state.

Now the spring 2 is laid around the mandrel x and double spring 3 and 4 is wound around the mandrels x and y in the same manner as described above. Simultaneously with laying the spring 2 over mandrel x the loops a and b can be interhooked with one another.

The spring 3 which is adjacent to spring 2 and is to be interwound with it, is therefore wound around mandrel x over which the adjacent spring 2 has been placed in an untensioned state, whereby the spring 3 is compulsory wound into spring 2.

Thereupon the spring 4 is conveyed onto mandrel x in an untensioned state, then the springs 3 and 4 are interhooked; spring 5 is then wound around mandrel x and spring 6 is wound around mandrel y, whereby springs 4 and 5 which lie adjacent to one another are compulsory interwound.

The springs 3 and 5 have of course the same diameter as all other springs, although their diameter as shown in the drawing is smaller, but this has been done merely for the purpose of clearness. This applies also to all other springs having a smaller diameter and shown located within larger springs.

In the above described manner it is rendered possible to produce series of springs of any desired length.

In order to connect the springs of the second row with the springs of the first row the operation proceeds as follows:

Firstly the springs 2 and 3 of the first row are placed upon the mandrels x and y in an untensioned state, whereafter the double spring 9, 10 is wound upon said mandrels in exactly the same manner as has been described with reference to Fig. 1 whereby the springs 2 and 9, or 3 and 10 respectively, will be interwound, they may then be drawn apart, compare Fig. 5. Now spring 11 must be interwound with spring 10, as well as with spring 4. For this purpose the springs 4 and 5 are placed upon the mandrels x and y in an untensioned state, furthermore, the spring 10 adjacent to spring 11 likewise in untensioned state is placed upon mandrel x in that this spring is drawn over in the direction indicated by arrow z. This can be done without any difficulty since the springs concerned can be easily shifted relatively to one another, as none of them are rigidly connected with any adjacent springs, but only interwound with same. Now the springs 11 and 12 are wound upon the mandrels x and y in exactly the same manner as above described, so that spring 11 is wound within the springs 4 and 10 and spring 12 is wound within the spring 5. When the springs are then drawn apart, the spring 11 will be interwound with the springs 10 and 4 and spring 5 with the spring 12.

The interwinding of springs 13 and 14 is again effected in the same manner, that the springs 6 and 7 are placed upon the mandrels x and y in an untensioned state, furthermore by drawing spring 12 over onto mandrel x in the direction indicated by the arrow z; the springs 13 and 14 being then wound around the mandrels x and y. This working procedure can be continued in the manner stated until a spring-net of the desired length and width has been manufactured. The springs projecting at the rim, as for instance the springs 1 and 8 can be inserted into the adjacent springs in order to reinforce the rim springing, or single springs are wound into the intermediate spaces and connected with the adjacent springs or with the frame.

The manufacture of a spring-net of single springs is effected in a similar, but far simpler manner, compare Figs. 7–14. In this case only one mandrel u is employed which however, operates in exactly the same manner, as for example the mandrel x in Figs. 1–6. Firstly the spring 1 is produced with the aid of said mandrel u. This spring remains on the mandrel u in an untensioned state, and into it is wound the spring 2, whereby spring 2 will be interwound with the spring 1. Then the spring 2 is placed upon mandrel u and spring 3 is wound around this mandrel which is then interwound with spring 2. The same takes place with a spring 4 (see Figs. 9 and 10). In this manner it is rendered possible to produce a row of springs having any desired lengths and interwound with each other.

In order to render it possible to manufacture the second row of springs the operation is carried out in a similar manner as described in respect to double springs. First of all spring 1 is again placed onto the mandrel u (Fig. 11), then spring 5 is wound around mandrel u, that is to say, into spring 1, whereby the springs 1 and 5 will be interwound. (Fig. 12.) Now the spring 6 must be interwound with spring 2, as well as with spring 5. For this purpose, not only spring 2 is placed onto mandrel u, but also the spring 5 is drawn over this mandrel in the direction indicated by arrow z. Then this spring is wound upon mandrel u, and in this manner spring 6 is interwound with the springs 5 and 2 (Fig. 13). The working is proceeded with in the same manner in order to complete the second row of the spring net. The spring 7 is wound upon mandrel u, upon which the springs 3 and 6 have been previously placed, this latter spring having been drawn over in the direction indicated by arrow z. When spring 7 is untensioned it is interwound with the springs 6 and 3 (Fig. 14). The procedure is continued in the same manner in that spring 8 is now wound upon mandrel u, which has previously had spring 4 and spring 7 placed upon it in an untensioned state.

Interconnecting of the loops a and b, Figs. 1–6, can be effected at any desired point of time. In Figs. 1–3 it is effected immediately after the spring concerned has been withdrawn from the mandrel; in Figs. 4–6 it is effected in a similar manner but one process section later, viz. after the springs of the second row have likewise been withdrawn from the mandrel.

The device for manufacturing the spring-net is constructed as follows:

Covering plate 2 is provided with appropriate apertures through which the mandrels x and y pass. A section of each mandrel is designed as pinion 24 which engages with a toothed segment 25 driven by means of connecting-rod 26 and crank 27 from shaft 28. The ends 29 of the winding mandrels x and y are designed as worms 30 in which a guide pin 31 engages and upon which the mandrels are given an upward and downward motion.

On the frontal face 32 of the winding mandrels a bolt pin 33 and an oblique jaw 34 are fitted which grip the end of the spring. The bolt 33, as well as said jaw 34 are situated immediately at the rim of frontal face 32. In front of mandrels x and y and on the covering plate 21 two stops 35 and 36 are fitted for the wire piece that has not yet been wound. Whilst stop 35 is mov-

able in the direction indicated by arrow **37** the stop **36** is rigidly fitted to this plate.

On the cover plate **21** and in front of the mandrels x and y a bending device is arranged consisting of a disk **38** which with its axle **39** fitted in support-bearing **40** carries a bridge-plate **41**. The diameter of disk **40** corresponds to the distance between winding mandrels x and y. On axle **39** a cog wheel **42** is also fitted, which is driven from shaft **28** by the intermediary segment **43** and with the aid of a pair of levers **44**, **45** and an eccentric **46**. The cog wheel **42** is rigidly connected with a lug **47** carrying a pin **48**.

The disk **38** can be raised from cover plate **21** by means of bolt **49**, in that an arm **51** of a double armed lever **51**, **52** be actuated by an eccentric **50** on axle **28**, and bears against the axle **49**.

The manner of operation of this device is as follows:

Firstly the method of producing a double-spring is to be described. The wire to be operated is drawn from a roll and conveyed forward by means of rollers **53** and **54**, rotating in the direction of the arrows immediately in front of winding mandrel y. The conveying rollers are driven by means of a pawl **55**, actuated from the shaft **28** by intermediary levers **56**, **57** and crank **58**, said pawl **55** engaging with the ratchet teeth provided on the circumference of wheel **60** located on conveyer axle **59**.

After the length of wire requisite for manufacture of a double spring has been fed forward it is cut off between a rigid knife **61** and a movable knife **62** actuated by lever **63** sliding in an eccentric curve **64** after said piece of wire has been cut off, lug **47** is moved in the direction indicated by arrow **65** and bolt **48** bends the wire **66** round the disk **38** giving it a hair pin bend. When this has been effected the bending device is lifted off from the cover-plate, whereby the bent wire can be pushed between the mandrels x and y by means of the eccentric **67** and the levers **68** and **69**.

Now both winding mandrels commence to rotate in the direction indicated by arrow **70**, whereby firstly the loops **71** are formed by means of bolts **33** and jaws **34**. Hereby mandrels x and y remain stationary in the axial position, but with continued operation the mandrels rise upwardly through cover-plate **2** by means of worm threads **30** so that the wire piece is taken along and winds itself tightly around the mandrels x and y.

The loop **72** (Fig. 17) not yet wound in the winding process becomes continually tighter and is held tensioned by the stops **35** and **36**. Shortly before completion of the winding operation the bolt **35** recedes so that the wire can contract to its final shape. Due to succeeding downward motion of the winding mandrels x and y the bolts **33** and the jaws **34** release the loops **71** of the spring, whereupon this automatically opens and to form the finished double spring shown in Fig. 5.

If two double springs are to be interwound this is effected by means of the device according to invention very simply in that, prior to downward motion of the mandrels x and y, viz. when the double springs still tensioned and tightly wound around the mandrels, for example the part **72** of the double spring as in Fig. 19 is placed over the winding mandrel x or over part **73** of the tensioned spring as in Fig. 17 respectively. If the mandrels x and y are now moved downwardly, the parts **72** and **73** spring into one another and hang together with their windings after being drawn apart.

In order to manufacture a single spring of the kind shown in Fig. 20 the mandrel x is disengaged, whereupon the rigid knife **61** is set at a distance from the loop-winding mandrel **75** as is requisite to form the loop **74**. Then a driver **76**, the edge **77** of which is designed as a cutting knife is moved in the direction indicated by arrow **78**, whereby the wire end is cut and loop **74** formed. The winding and inter-winding is effected in the same manner as for a double spring.

HUGO BÜTTNER.

PUBLISHED H. BÜTTNER Serial No.
METHOD AND DEVICE FOR MANUFACTURING SPRING-NETS
MAY 11, 1943. FOR MATTRESSES, SEAT-CUSHIONS AND THE LIKE 445,792
Filed June 4, 1942
BY A. P. C. 3 Sheets-Sheet 1

Fig.1

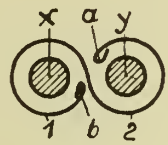


Fig.2

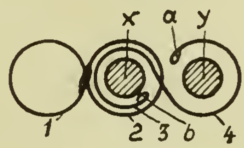


Fig.3

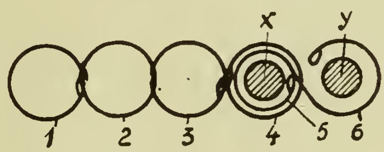


Fig.4

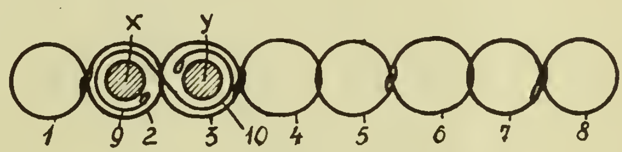


Fig.5

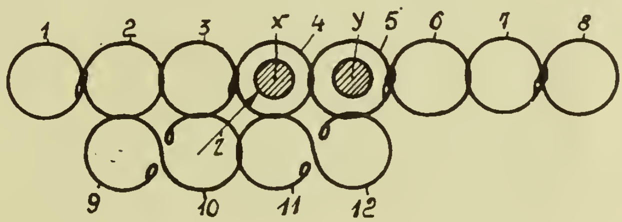
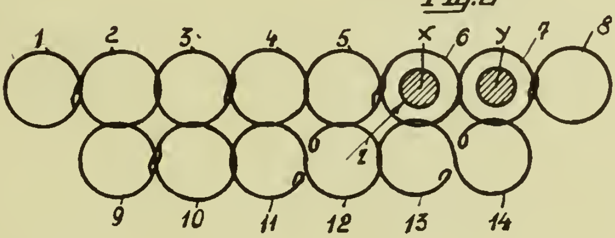


Fig.6



Inventor,
Hugo Büttner
Frank S. Appleman
Attorney.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. BÜTTNER
METHOD AND DEVICE FOR MANUFACTURING SPRING-NETS
FOR MATTRESSES, SEAT-CUSHIONS AND THE LIKE
Filed June 4, 1942

Serial No.
445,792
3 Sheets-Sheet 2

Fig. 7

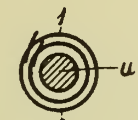


Fig. 8

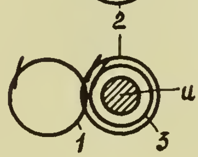


Fig. 9

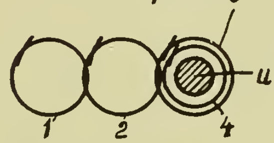


Fig. 10

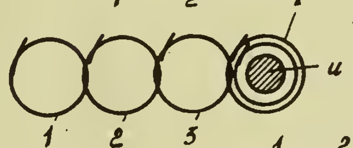


Fig. 11

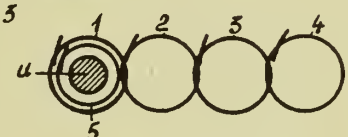


Fig. 12

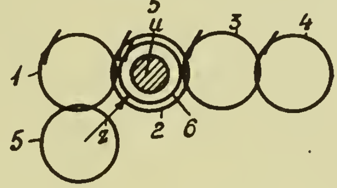


Fig. 13

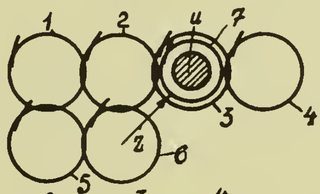
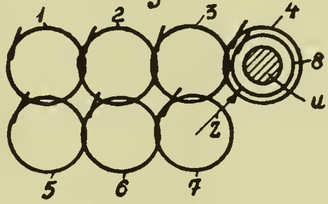


Fig. 14



Inventor,
Hugo Büttner
By Frank S. Appleman
Attorney

PUBLISHED MAY 11, 1943. BY A. P. C.

H. BÜTTNER
METHOD AND DEVICE FOR MANUFACTURING SPRING-NETS FOR MATTRESSES, SEAT-CUSHIONS AND THE LIKE
Filed June 4, 1942

Serial No. 445,792

3 Sheets-Sheet 3

Fig. 15

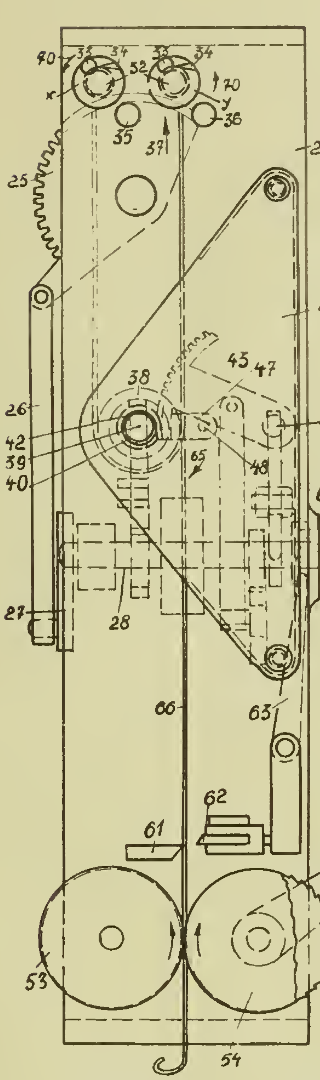


Fig. 16

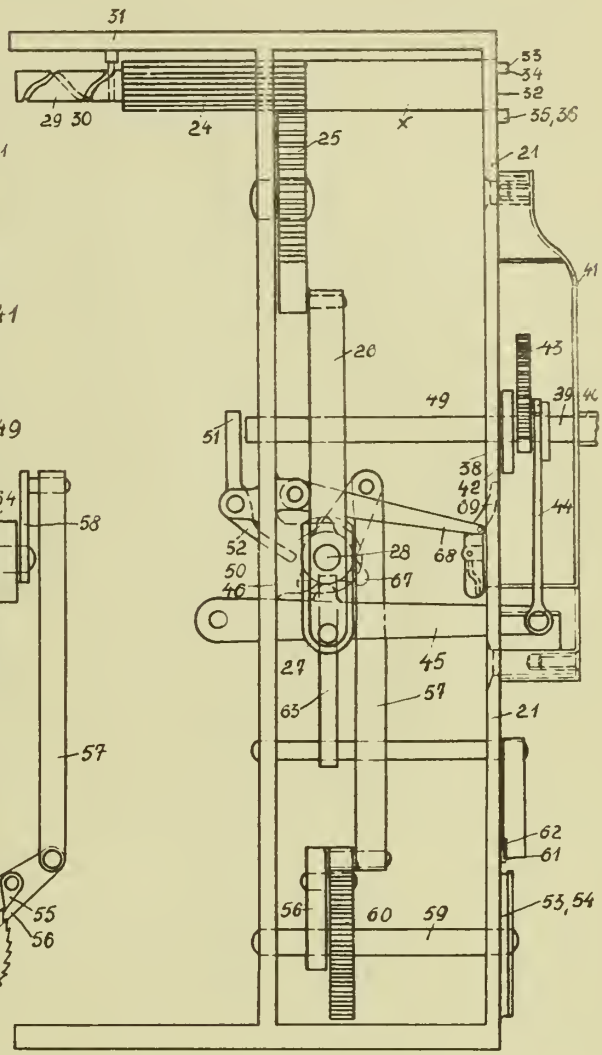


Fig. 17

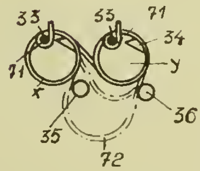


Fig. 18

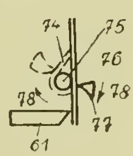


Fig. 19

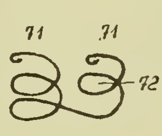


Fig. 20

Inventor,
Hugo Büttner
by Frank S. Appleman,
attorney

Published May 11, 1943 Serial No. 445,791

ALIEN PROPERTY CUSTODIAN

PROCESS OF FORMING SPRING FILLERS FOR FURNITURE AND THE LIKE

Hugo Büttner, Wuppertal-Vohwinkel, Germany; vested in the Alien Property Custodian

Application filed June 4, 1942

This invention relates to a method of forming fillers for seat cushions, upholstery, mattresses, sofas or the like, in which rows of coiled springs are made of one continuous wire and the single coils are arranged in parallel position with respect to each other by bending a predetermined number of windings.

More particularly, the present invention relates to a process for producing a number of parallel and juxtapositioned rows of spirally coiled windings corresponding to the width of the filler to be formed arranged in parallel position by bending a long wire spiral at points spaced to correspond to the desired height of the coiled springs, the long spiral being bent alternately in opposite directions to the extent of 180° and the coils being united with one another at their unconnected windings by means of suitable clamping or connecting means.

In this respect, it is advantageous to spacedly arrange the spirally coiled windings used for producing the rows of coiled springs, thus facilitating the insertion of the clamping or bending tool, besides forming an even surface for the seat cushion or other devices.

The adjacent or juxtapositioned rows of spiral coils may be intertwined with their respective windings after the wire winding mandrel is removed and prior to the bending operation. On the other hand, it is also possible to connect with one another the rows of spiral coils, prior to the bending thereof, either with the aid of coils of relatively smaller diameter or with clamp-like fastening means.

With the foregoing and other objects in view, the invention consists in the details of construction, and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings forming part of this application, wherein like characters denote corresponding parts in the several views, and in which:

Figure 1 illustrates a top plan view of the spring filler;

Figure 2 illustrates a side elevation thereof;

Figure 3 illustrates a diagrammatic view of some of the rows of coils used for the preparation of the filler;

Figures 4 to 7 show the process in a plurality of steps in, plan view and in side elevation in which, to make it clear, the side elevation of only one row of coils is shown; and

Figure 8 illustrates a spring filler shown in the form of an automobile seat cushion.

The seat cushion set forth in Fig. 1 comprises six rows of coils *a, b, c, d, e, f,* each row consisting of a continuous wire, the single springs of the seat cushion being arranged in parallel relationship by bending off from a long wire spiral a predetermined number of springs each formed of a desired number of spiral windings, the bending being first in one direction and then in the opposite direction. As disclosed in Figures 1 and 3, the rows of coiled springs have their adjacent windings intertwined, whereby, as clearly shown in Figures 1 and 3, the rows of springs are formed of alternate right or left coils.

The spring structure illustrated in Figs. 1 and 2 is held under tension in known manner, by means of lateral supporting frames *i, k.*

The seat cushion may be prepared, for example, by advancing the interconnected rows of coils *a, b, c, d, e, f* far forward enough to permit simultaneous grasping of the coiled wire by means of suitable bending and clamping tools on the dash-and-dot line *x—x* shown in Fig. 3, whereupon a predetermined number of windings is bent off by said tools from the original rows of coils *a, b, c, d, e, f* and brought into parallel relationship.

In Figure 4, for example, the bending and clamping tools are applied between spiral windings **3** and **4**. Since the tools are capable, as illustrated in Fig. 3, of simultaneously grasping all other windings, the free windings **1**, **2**, **3** of all rows of coils *a, b, c, d, e, f* are simultaneously bent off at the bending point x' and brought into parallel relationship with respect to the corresponding row of springs (see Fig. 5).

In Figs. 4 to 7, to make it more clear, there are shown only single rows of coils *a* having at one of their ends the required number of bent off windings. It is clear, however, that the same operation is simultaneously performed with all other rows *b, c, d, e, f.*

As shown in Fig. 5*a*, the rows of coils *a, b, c, d, e, f,* with the bent off windings **1**, **2** are all pushed so far forward as to permit grasping of the coiled wire at the new bending point x^2. In Fig. 5*a* this bending point lies between windings **6** and **7**. At this point, the windings **4**, **5** and **6** of all rows of coils *a, b, c, d, e, f* are again brought into parallel relationship with respect to the original row. In this instance, however, the bending off is made in the opposite direction to that of the previous bending. Figure 6 illustrates

the row of coils *a* after two bending off operations.

After again pushing the coils under the bending tools, renewed bending is carried out at bending point x^3 lying between windings 9 and 10. This bending is made in the same direction as in the first operation in order to form a row of coiled springs as shown in Fig. 7. This row of coils is then again bent off at bending point x^4 lying between windings 12 and 13 in the opposite direction to that of the previous operation, and so forth, until finally there will result compact rows of coils extending over the entire length of the seat cushion, as illustrated in Figs. 1 and 2.

Since the process set forth in Figs. 4 to 7 is carried out simultaneously with all rows of coils, it is possible to produce the finished spring filler in an extremely short time. The springs may be attached to one another at those windings that are not connected to adjacent springs, by means of clamps, spiral coils or the like.

The new process, according to the present invention, enables the preparation of seat cushions having springs of any suitable height, by purely mechanical means, i. e. by adjustment of the clamping and bending tools applied to the coils *a, b, c, d, e, f*.

It is possible, for example, to prepare the automobile seat cushion shown in Fig. 8, by properly adjusting the feed of the row of coils to first bend off a single winding simultaneously from all rows of coils corresponding to the width of the cushion, whereupon one after another, two springs with two windings, four springs with four windings, and finally, two springs having each five windings are bent off in opposite directions by means of bending tools, from the original rows of coils.

Instead of pushing or feeding single rows of coils under the clamping or bending tools, it is naturally possible to have these coils remain stationary and have the adjustable clamping or bending tools move to grasp the portions of coiled wire to be bent.

HUGO BÜTTNER.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

H. BÜTTNER
PROCESS OF FORMING SPRING FILLERS FOR
FURNITURE AND THE LIKE
Filed June 4, 1942

Serial No.
445,791

Fig. 3

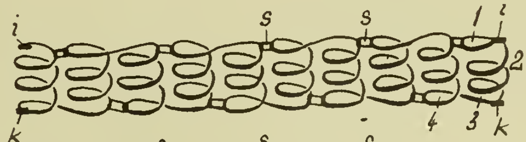


Fig. 2

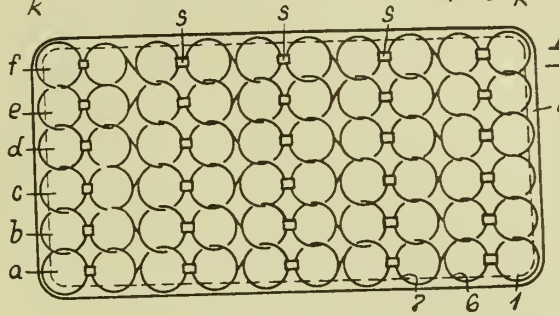


Fig. 1

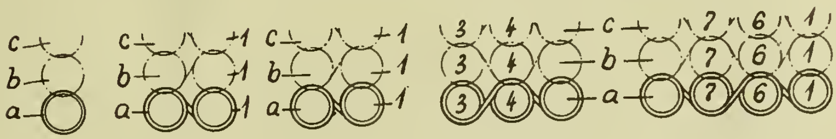
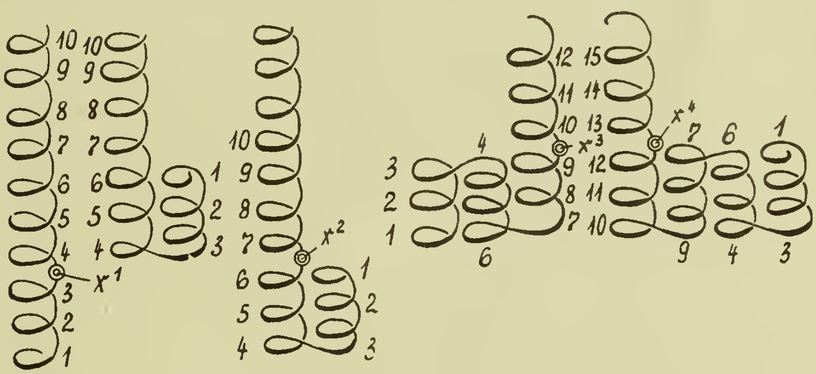


Fig. 4 Fig. 5 Fig. 5a Fig. 6 Fig. 7



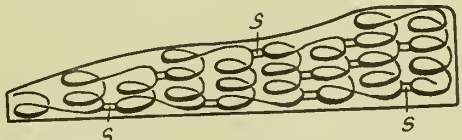


Fig. 8

Inventor
Hugo Büttner
Frank S. Appleman
attorney.

Published May 11, 1943 Serial No. 450,937

ALIEN PROPERTY CUSTODIAN

DEVICES FOR STARTING AIRCRAFT ENGINES

Charles Raymond Waseige, Rueil-Malmaison, Seine-et-Oise, France; vested in the Alien Property Custodian

Application filed July 14, 1942

The present invention is a division of my copending application Serial No. 343,303 filed on 29th June 1940.

My invention relates to the devices used for starting internal combustion engines for aircrafts and the like and more particularly to electric devices for producing the ignition during starting, and has for its objects a number of improvements in this type of devices.

A first improvement consists in a switch provided with two contacts which are connected to the frame and respectively co-operate with two movable contacts, one connected to one of the magnetos of the engine to be started and the other to the second magneto, and at least a third fixed contact which is likewise connected to the frame and co-operates with a third movable contact connected to the auxiliary starting generator.

In the case in which said generator is a coil, the switch is provided with a fourth fixed contact which is identical to the third and which co-operates with a fourth movable contact, these two movable contacts being adapted to occupy three positions and to contact respectively with two other fixed contacts connected to the two poles of the source of current.

Other objects and features of my invention will furthermore become apparent from the ensuing description of an exemplary embodiment of an apparatus for the ignition during starting and be more fully pointed out in the appended claims.

In the annexed drawings:

Fig. 1 shows diagrammatically an apparatus for the ignition during starting including a starting magneto.

Figs. 2 and 3 show the controlling switch in two other operative positions.

Figs. 4, 5 and 6 are respectively similar to Figs. 1, 2 and 3 in the case of apparatus provided with a starting coil.

In Fig. 1, which shows diagrammatically the electric apparatus for the ignition during starting, **201** designates the magneto for normal operation and **202** the starting contact with which said magneto is provided, **203** designates one of the spark plugs and **204** the metal mass of the engine; **205** is the starting magneto, the secondary of which is connected by a wire **206** to the starting contact **202** of the normal operation magneto **201**, whereas its primary is connected by a wire **207** to a movable contact **208** of a switch **209**. Said contact **208** cooperates with a contact **210** and the switch is provided with two other contacts **211** and **212** which are connected to the frame **204** and co-operate respectively with movable contacts **213** and **214** respectively connected by the wires **215** and **216** to the normal operation magnetos of the engine.

The operation of this apparatus is as follows:

In the inoperative position (Fig. 2), the three movable contacts **208**, **213** and **214** are respectively connected to the corresponding contacts **209**, **211** and **212** and the respective primaries of the three magnetos are connected to the frame. The ignition is cut off and there is absolute safety.

In order to start the engine (Fig. 3), the movable contacts **208**, **213** and **214** are separated from the contacts **209**, **211** and **212** and the primaries of the three magnetos are insulated from the frame. The three magnetos can therefore all supply current at once.

In normal operation (Fig. 1), the movable contacts **213** and **214** are separated from the contacts **211** and **212** but the movable contact **208** is on the contact **209**. The normal operation magnetos therefore continue to supply current whereas the starting magneto **205** no longer supplies current, its primary being connected to the frame and the high frequency oscillations being short-circuited to the frame.

The apparatus shown in Fig. 4 differs from the previous one by the fact that the high tension starting generator is formed by a coil **205*a***. One of the ends of the primary of said coil is connected to the movable contact **208** as was the above starting magneto **205** but the switch is provided with a contact **218** which co-operates with said movable contact **208** and which is connected by a conductor **219** to one of the poles of a source of current **220**. The other end of said primary is connected to a shielded switch **221** which is itself connected to a movable contact **208*a*** of the switch, which contact is similar to the contact **208**, and which co-operates with two contacts **210*a*** and **218** respectively connected to the contact **212** and, through a conductor **222**, to the second pole of said source of current.

The operation is the same as in the previous case and it is obvious (Fig. 4) that, in normal operation, the coil **205*a*** is completely insulated from the source of current **220** while the normal operation magnetos are connected to the frame through the coil **205** owing to the fact that the movable contacts **208** and **208*a*** are connected to the contacts **210** and **210*a***.

When inoperative (Fig. 5), the normal operation magnetos are directly connected to the frame, the movable contacts **213** and **214** being

respectively connected to the contacts **211** and **212** and the coil is again completely insulated from the source of current **220**, the contacts **208** and **208*a*** being open.

In the position for starting ignition (Fig. 5), the contacts **108** and **108*a*** are connected to the contacts **118** and **118*a*** and the coil **105*a*** is thus connected to the source of current **120**, whereas the contacts **113** and **114** are open and the corresponding magnetos are insulated from the frame.

Whether the starting high tension generator is a magneto or a coil, the movable contacts of the switch are preferably conjugated with each other in such a manner as to be operable by means of a common hand or foot operated member.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification, without departing from the spirit of the invention, I therefore do not wish to be limited to the precise details of construction set forth.

CHARLES RAYMOND WASEIGE.

PUBLISHED
MAY 11, 1943.
BY A. P. C.

C. R. WASEIGE

DEVICES FOR STARTING AIRCRAFT ENGINES

Filed July 14, 1942

Serial No.
450,937

FIG. 1

FIG. 2

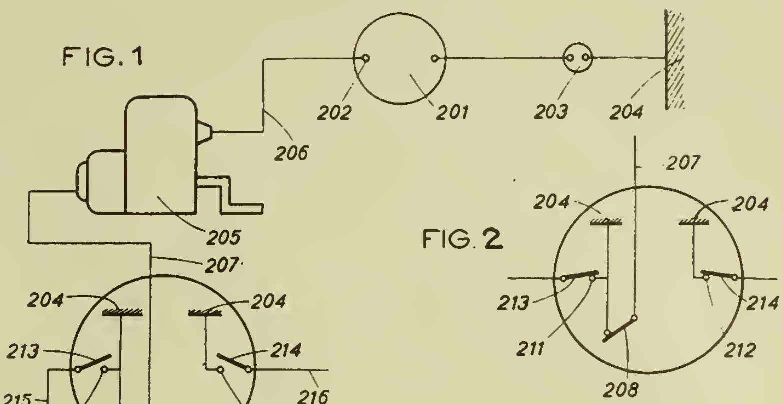


FIG. 3

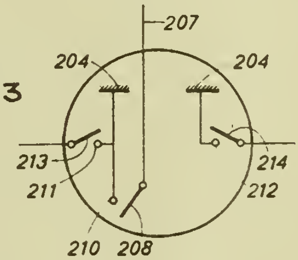


FIG. 4

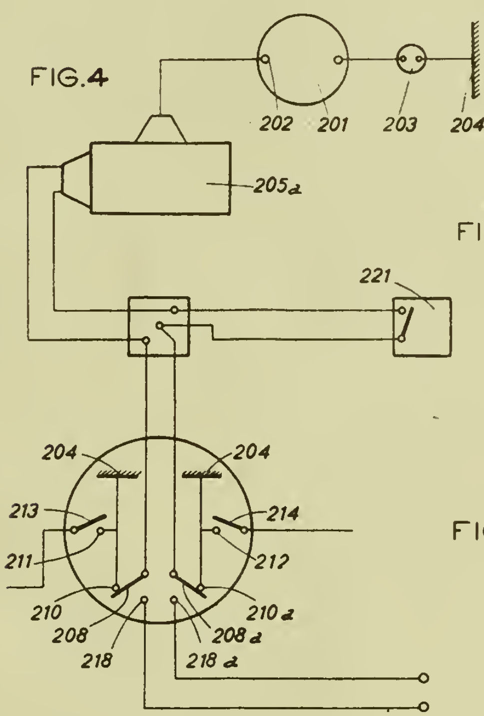


FIG. 5

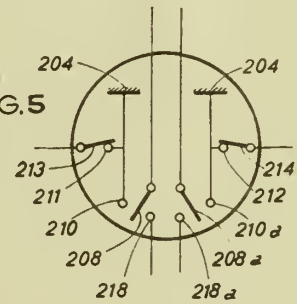
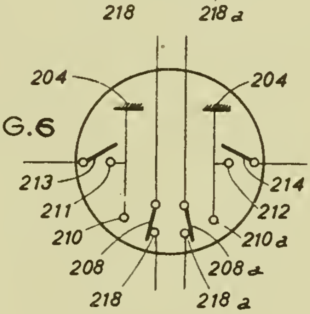


FIG. 6



Inventor
Charles R. Waseige
By Glascock Downing & Seebold
Attys.

F